

AVIATION WEEK

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APRIL 5, 1954

50 CENTS



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FIRST IN RUBBER



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TO MAKE important business calls, executives of the Hoover Company fly all over the country in this DC-3. Like many other executive planes, it carries B. F. Goodrich equipment to prevent delays, add safety, cut costs. Here's what Pike Mackey McDowell and Co. pilot Dave Adams have to say about the BFG equipment.

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brakes are only five more landings per hour, but are lighter, make landings smoother and safer."

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Clipper Seal being installed in the intermediate gear box of the Sikorsky HO5S helicopter to seal oil in, keep abrasives out, keep elements out.

...seal oil in, keep abrasives out, at critical locations

To retain the lubricants vital to its complex rotor and gear systems... and to protect bearings against the infiltration of abrasives... the new Sikorsky HO5S helicopter depends on these positive sealing qualities of Johns-Manville Clipper Seals.

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To find out more about Clipper Seals and their application to your particular sealing problems, write Johns-Manville, Box 60, N. Y. 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

Photograph and cross section of Type LHD Clipper Seal. This is just one of numerous styles available to solve tough sealing problems.



Johns-Manville PRODUCTS for the AVIATION INDUSTRY

Domestic

USAF's experimental Cessna XP-51A and two Northrop X-4s have completed high-speed research work at Edwards AFB, Calif., and are being readied for use in strike duty. The XP-51A and one X-4 will be shipped to the Air Force Technical Museum at Wright-Patterson AFB Dayton, the second X-4 will go to the Air University at Maxwell AFB, Ala.

Northrop Aircraft has received a \$155 million Air Force contract for production of additional F34 all-weather interceptors, new milling out of the plant builder's Hawthorne, Calif., factory. The new contract increases Northrop's backlog to a record \$557 million, schedules deliveries of the all-weather Scorpions through August 1976.

American Airlines DC-7s broke the transcontinental speed record for commercial transport twice in less than 24 hr last week, setting an official Los Angeles-New York record of 6 hr 10 min Mar 29 and beating that speed the following day with an unofficial time of 5 hr 31 min. The official record was timed by National Aeronautics Administration mark 6 hr 17 min, set in 1949 by an Eastern Air Lines Constellation.

Air transportation has now reduced from 1958 to 1976 last week when President Eisenhower signed the measure, bill (Aeromarine Week Mar 20, p 12). The measure also contains the two-year aviation gas law, previously scheduled to be cut to one and a half years Apr 1.

Makulu Airlines has purchased a \$1.5 million DC-7 helicopter, will begin operating the eight-passenger rotor in scheduled service early this summer at the \$355 more than \$416,000.

Chinese Nationalist government on Formosa will receive assistance from Civil Aeronautics Administration in rebuilding an aviation system. A CAA team, sent assigned to the Far East under the Foreign Operations Administration's program, will advise the Chinese on air structure, installation and testing of their WIP aircraft, maintenance, and on training of personnel to operate radio control and aeronautical communication along aviation routes to be established.

United Air Lines has taken delivery on the first of 21 Douglas DC-7s on order, plans to begin operating the



B-47's New Takeoff Power

Timing clocks at Seattle, a Boeing Stratopilot makes tests of, using 11 cylinders fired in sequence, 1,000 ft of thrust each in sequence, the power of its General Electric J47 turbojet. Power of Stratopilot J47s has been increased with use of water injection to improve thrust performance. Series B-47s on flight with 15,000-lb thrust each now in the backlog. The new powerplant arrangement, fitted to B-47s, has provided an increase of 15,000 lb in takeoff weight for a maximum gross weight of 230,000 lb. The new cockpit unit units are mounted as a "secondary" fitting and can be processed after use instead of burning down weight is the one with water control unit. The component was formerly given only to internal cockpit mounting now can be used to very additional equipment.

Wright Turbo Compound-powered transports have 1 on existing transport aircraft flights. Cost of UAL's DC-7 fleet, \$55 million.

D. Walter Swann, assistant to the president of United Air Lines, has taken a leave of absence from UAL to accept an appointment as Deputy Assistant Secretary for Policy Affairs in the Defense Department.

Air Traffic Digest has been produced by American Aviation Publications, Inc. incorporated in the Washington D. C., company's Traffic News Apr 1.

Financial

Trans World Airlines reports a net income for 1975 of \$5,064,702, a decline of \$2,980,196 from 1974. Gross income climbed to a record \$187,120,568. TWA's net difference in net income principally was caused by an increase in depreciation charges of about \$5 million in new aircraft.

Continental Air Lines' net income for 1975, boosted by the sales of five Convair 440s, increased 95% to \$1,120,771. Total operating revenues were \$11,079,895, compared with \$8,992,362 for 1974.

Republic Aviation Corp., Farmingdale, N. Y., reports a net income for 1975 of \$5,014,004 from sales totaling \$11,818,885, compared with 1974's \$8,096,001 net and \$412,219,000 in sales. Backlog Dec 31 more than \$1 billion.

Kansas Aircraft Corp., Mansfield, Conn., had net earnings of \$345,065 during 1975, a drop of \$99,139 from the previous year's \$246,063. Sales increased to \$11,046,236, compared with 1974's \$9,277,527. Backlog, \$90 million.

Trans Caribbean Airways has delivered a first order delivered on Glen A. stock, payable Apr 15 to shareholders of record Mar 15.

International

Aeromarine de Mexico DC-4 ordered and based in the Sierra Mountains Mar 26, seconds after the transport was moved off from landing in a dust storm in Monterrey. Apr 15 persons aboard were killed.

Fussy Gyrodne records engine, Britain's first jet-driven rotary-wing aircraft, has completed initial flight tests. The Gyrodne is powered by an Avon Lycoming engine that drives propellers, which force air through two-stage blades and out the tips.

Amdt AOP-3B, a new British transport aircraft, is scheduled to make its first flight in the near future. The three-engine plane is powered by a 100-hp Blackburn Bombardier engine, already has been ordered in quantity by the British Army.

India's automated air transport system has ordered two Lockheed Super Constellation and two de Havilland Comet 3s. First two Super Constellation are expected by June.

New heart for servo systems



Airborne's servomotor

This model, produced in our plant as part of a magnetic amplifier, was developed by our Control Engineering group. It is typical of the custom design work they do.

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April 5, 1954

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WHO'S WHERE

In the Front Office

Lawrence M. Lindholm is now vice president manufacturing for Reo Aircraft Co., San Diego. Donald S. Proby is its controller.

Edward R. Hays has been elected senior vice president of Aircraft Supplies, Inc., Dallas, N. J.

Earl E. Bales has been promoted by Chance Vought Aircraft, Inc. to assistant to the president for public relations. John Hays has been appointed public relations manager for the Dallas aircraft center.

Changes

Carl E. Sailer is manager of the new Aviation Division set up by Consolidated Machine Tool Co. at Buffalo, N. Y., by splitting its former Hydraulic Division into two groups under The New American Division contracts manager P. A. Anderson.

T. N. Baker, corporate manager of Control Motors Corp.'s Allen Aircraft Division in San Diego, has been appointed general sales manager for Consolidated Tool & Machine Co., Los Angeles.

Charles J. Barnes, formerly president of aircraft division of Eastern Corporation of America, Wallingford, Conn.

Robert J. Wright has become foreign systems manager for Edwards Manufacturing Co., Los Angeles, replacing James M. Gibson, who resigned.

Herbert B. Gossage is now systems engineer in San Diego, N. Y. Richard M. Oliver has been appointed staff representative for Aircraft Industries America's military, aircraft, and powerplants and propulsion committees.

Arthur A. Conrad, Jr., has joined the Detroit headquarters of International Nickel Development Co. as director of research.

Robert L. Werts has joined Bell Aircraft Corp., Buffalo, N. Y. as a test pilot for the flight research department. Clifford J. Bell, department engineer, has been assigned as test free engineering test pilot.

Frank A. Beattie has been appointed engineering manager for hydraulic aviation and defense division for Jenbacher Aircraft Engine Co., Patterson, Pa.

Honors and Elections

Dr. R. M. Stone, director of research at American Plastics Co., has been elected president of the 1954 National Electronics Conference to be held Oct. 4-6 in Chicago.

Leon Edgerton, chief chemist and chief member of Reo Aircraft Corp., has been appointed a consultant to the Small Business Administration.

G. S. Kishner, public relations manager for Frontier Airlines, has been elected chair man of the Air Transport Committee. Richard Gifford of Eastern Air Lines is now vice chairman.

Kenneth G. Fiedler, mechanical engineer for Cook Equipment Co., has been named a representative on the board of directors of the National Association of Manufacturers in Baltimore and also chairman of the Board of Directors of the National Association.

INDUSTRY OBSERVER

Boeing has developed a new approach to atomic power for aircraft used in combining high speed with long range. USAF is currently interested.

English Electric F-35 supersonic delta interceptor will be powered by two latest versions of the Armstrong Siddeley Sapphire turbojet equipped with afterburners. Company hopes to get Mach 1.5 from the current delta-epsilon combination.

Aircraft and engine technical committees of the Aircraft Industries Assn. are making a critical evaluation for USAF of the increased engine and engine performance possible from the use of atom turbines.

Glen L. Matto Co. has developed an electronic warning system for the Navy Signal Corps and now is putting the system into production.

Casey Aeronautical Laboratory at Buffalo received \$2.5 million in new research contracts during the past four months, bringing total value of its current contracts to \$34 million.

Boeing Helicopter Corp. is incorporating 27 engine modifications in its H-21, grounded last month by USAF. Tests of the modified aircraft will start about May 1 at Wright Air Development Center in Dayton, Ohio.

Two metal helicopter blades of new design have been developed and successfully tested by Piasecki Helicopter Corp. One blade, with an 42 ft. diameter, is fabricated of aluminum using high-speed construction techniques. Other blade, with a 48-ft. diameter, has a steel core with the remainder constructed of aluminum. It has passed its 105 lb. test.

Navy is considering a switch in order scheme for its combat aircraft from their present dark blue to gray. Flying boats and patrol planes would remain blue and trainers, transport and utility aircraft would be modified according to their missions. Navy officials have been discussing the proposed changes with paint manufacturers.

Douglas Aircraft is trying to attract USAF in a helicopter-powered tactical version of the C-119 to meet the growing military requirement for a high-altitude, high-speed, large-capacity scout bomber.

Consolidated is investigating the possibility of using British Napier Elan turbojets rated at 3,800 shp. as its commercial version of the gas-turbine-powered Conquest 340.

Lockheed Aircraft Co. is now saving \$1,570,000 a year in plant and office space. This is more than the entire defense industry sold last year to World War II.

Curtis Propeller Division is manufacturing servicing gas tanks for Navy carrier-based aircraft, gas boxes for jet engines and rotor hubs for helicopters, in addition to its standard line of propellers for piston and turboprop engines.

Aircraft Industries Assn. has asked both NACA and Defense Department to operate the aircraft workshop on a fee basis for industry on the ground that such a system will encourage economy and efficiency and provide for a proper accounting of development costs.

Observers who have seen the mockup of Republic's upcoming jet F-105 say the new fighter's configuration will be an "eye-opener" when it is revealed. The aircraft has an incredibly long nose and "yaw" delta wings, they report. To be successful mainly of thrust, the F-105 will be light for its day, it is said.

Republic Aviation Corp. has rolled out its turbojet-powered F-56H wingman fighter. Industry observers say the plane probably will be flown to Edwards AFB, Calif., for flight testing. Civil business a "T" tail with horizontal stabilizers mounted atop the vertical fin.

policy with regard to progress reports.

Progress payments in the past have been used for such purposes as issuing rapid inventory controls. Review will state that the payments will be determined strictly in the basis of maintenance's financing requirements.

ACC also will develop a policy on a common navigation system, working closely with the Air Navigation Development Board. This is a technical report that will be separate from the overall policy review.

■ **Review Expanded.**—The committee has expanded its study to include an analysis of U.S. policies toward the aircraft maintenance industry.

However, ACC will have recommendations to the field where both civil and military aircraft development, production and sales are affected. Partly because aspects will be transferred to the Department of Defense.

■ **Airpower Study Need.**—Sen. Stuart Swenson recently urged establishment of an air policy commission and a joint congressional aviation policy board. Two such boards were known in 1949. Sen. Swenson stated: "I have always believed that if the recommendations of the five commissions had been followed, we would not have had the Korean war."

Swenson pointed out that one of the reasons for forming the two commissions would be to develop an air power policy. ACC's review does not extend into military aviation requirements.

In an interim report on May 15 to Sherman Adams, Assistant to the President, ACC Chairman Mason stated: "By about Apr. 1, the committee proposed to have, on command, to issue separate preliminary papers which then will be coordinated. Those have been prepared by since 40 separate interdepartmental recommendations in accordance with ACC priorities. These were prepared after analysis of recommendations from interested agencies of the nation industry and public."

■ **Working Group.**—In detail, the ACC's development of the review works in this manner: A working group from each interested Federal agency is appointed to deal with a specific subject. It produces a policy paper draft, which is coordinated by Federal agency responsible to deal with a specific subject.

The group draws up a policy paper draft and turns it over to Federal agency members at the next highest authority above the working group. The paper then is forwarded to the committee by a special liaison group which is composed of top aides to the members of the committee.

■ **Liaison Group.**—Members of the special liaison group are Fred B. Lee, Civil Aeronautics Administration chairman; Emory T. Nussle, general counsel,

Knots Win

Knots and nautical miles will replace the statute-mile system throughout the air transport industry.

Civil Aeronautics Board has ruled on an issue which began in April 1959 and boiled into a major controversy. Although the military operates on nautical units, various aviation groups have battled the switchover on commercial airline service.

Private pilots have the option of using either statute or nautical units under the Board's order.

Speed and distance information normally will be transmitted in nautical units in ground-to-air communication, but upon specific request will not be transmitted in statute units, CAB said.

Changes will not be required in charts currently associated with radio, approach charts, radio flight charts, enroute charts, arrival and departure charts, and non-enroute charts.

Civil Aeronautics Board, vice chairman, Bailey D. Nash, Deputy for Civil Aviation, USAF; Robert D. King, Deputy Administrator of the Army, J. F. Kyle, special assistant to the Assistant

Secretary of the Navy for Air and E. F. Wadsworth, director, Bureau of Air Service, Post Office Department; J. Paul Berringer, director, Office of Transport and Communications Policy, Department of War; Capt. A. J. Bedford, chief, Legal Branch, U.S. Coast Guard, Treasury Department.

Following approval by the finance group, the paper is given to Colin McIninch, a special consultant, who prepares the policy recommendations for submission to aviation industry groups, such as Aircraft Industries Assn. and Air Transport Assn. Industry organizations will be permitted two days in which to comment on the policy papers.

The papers, with industry comments, will be considered at sessions of ACC.

■ **Implementation.**—After approval by the full committee, the report is forwarded to the President.

Meanwhile, "The procedure is cumbersome, but it is a necessary reminder of inter-departmental agreement and executive decision in many fields of United States and international air policy."

"While this process of inter-departmental aviation takes time, it will prove for the President's consideration a report that can be ready for immediate implementation except, of course, where legislation is necessary."

The "immediate implementation" is a major point in the review. Along with each recommendation, ACC will assign a specific agency responsibility for carrying out implementation.

Provisional assignment of recommendations and assignments will have the effect of an executive order. This is one of the differences between the ACC review and the Executive Commission report of 1948, which proposed only recommendations and did not specifically assign agency responsibility.

■ **SAF-800.**—CAB-ACC plans to file a consolidated supplementary report reviewing status of subjects not definitively settled at the time of the publication of the review. An example of this is the problem of mail rates between Post Office Department and CAB.

Cost of the review is approximately \$15,000, which goes for salaries to two full-time special consultants and one part-time consultant.

Full-time consultants are Gail McIninch, a Washington aviation consultant who will edit the final report, and Roger Murray, vice president and economist of Aviation Trust Co., New York, who is handling the coordinating aspects of the review. Part-time consultant is Charles Gray, executive secretary of ACC and now an official with Curtis-Wright Corp. Gray is concentrating on tariff export policies and will look into present export insurance regulations of the Export-Import Bank.

Also shown are the three vice presidents who accompanied the flight left to right: Richard Leach, Lt. Col. Gay M. Townsend and Capt. John Elrod.

Air-Rail Fight

• Airlines ask fair chance to win federal business.

• ATA and nonusers join to battle undercutting.

Three competitive airline associations—Air Transport Assn., Air Coach Transport Assn. and Independent Military Air Transport Assn.—have joined forces in an effort to end undercutting by railroads for military and other government business.

This is the crux of the matter. The 1949 Interstate Commerce Act permits railroads to transport government personnel free or at reduced rates.

The provision, carried over from the mid-Nineteenth Century when the government encouraged transcontinental rail service through land grants, provides for special rail rates to the government in a number of ways.

Both scheduled and nonscheduled air carriers have their hands tied in quoting low fares for government business. The 1949 Civil Aeronautics Act provides that all airline fares are subject to Civil Aeronautics Board approval and will be published in advance.

■ **Air Traffic Leases.**—The result of this situation is that railroads are free to make deals with the Defense Department for military personnel transport at lower amounts than airline bids.

There is no requirement that rail bids be published and made known to airline competition, or be approved by the ICC. Airlines, however, cannot bid below tariff bids and approved by CAB.

From a national point of view, INATA and ACTA are most deeply concerned, because military traffic represents a major portion of their income. These independent carriers report drops of 20% to 50% in military business due largely to underbidding by rails. They say the rails have bid less on longest routes, were competing air and air stand and tariffs for non-competitive military business.

■ **Policy Principle.**—ATA is concerned not only about the loss of defense business, which represents a comparatively small part of scheduled airline income, but the rails but also on the policy principle involved. If this principle is adhered to and uniformly applied.

■ **The 1915 CAA.** Aid would be extended to general airlines and railroads to bid for free or reduced rates tender to the government. This would mean all not only among the airlines, who would be attached to the rail, but Post Office mail contracts as well as military business.

Atomic Engine

Atomic Energy Commission plans to spend \$14.2 million program for continuing development of two aircraft propulsion reactor projects in fiscal 1959.

Of the total, \$6.6 million is reserved for a contract with Pratt & Whitney Aircraft and \$7.6 million for a contract with General Electric Co. Each company will start a defense approach.

The program set at below fiscal 1959 level of \$15 million and the 1955 level of \$17.3 million.

■ **NAA Contract.**—AEC also plans a \$1.5-million contract with North American Aviation next year for continuing development of a sodium-vapor reactor, one of the power-generating reactor projects sponsored by the commission. The project involves development, construction, and operation of a reactor designed to produce 20,000 kilowatts of heat.

North American has agreed to contribute \$2.7 million of the total \$4.2 million cost of the project, scheduled to be completed in 1955.

In meeting the rail's strategy to capture defense business, the three airline associations are using three divergent approaches.

■ **INATA** is asking correction of the statute at ICC. The association has filed a case, naming 112 railroads as defendants and charging they are in-

gaging in "unfair, arbitrary, unfair and discriminatory competition" that has an agreement with the policy of the 1948 Transportation Act for sound development of transportation under fair competition. A deadline of Apr. 15 has been set for the filing of arguments by the railroad interests, after which the case will be set for hearings.

■ **ACTA** is seeking to obtain action by Defense Department and has presented a brief pointing to the act's ineffectiveness through the wrong of the past time of military procurement—through the use of air, rather than rail transportation.

ACTA did not give in the INATA suit with ICC, because the association felt this proceeding would be lengthy and, in the meantime, Defense Department would continue granting low bids to railroads for the rail's pricing advantage of the rail.

INATA, on the other hand, said statements from key defense officials that the department had no alternative but to accept low bids convinced the association there would be no aid from Defense Department and that it should take measures to ICC.

■ **ATA** generally is interested in legislation introduced by Rep. Carl Albert, which would compel rail to the ICC. Act provision giving the rail a free hand to bid low on government business. In addition to eliminating railroad undercutting for defense business, this also would set a precedent against direct Post Office Department contracting with unscheduled airlines for mail business at rates below the scheduled rates. Postmaster General Arthur Sweeney is seeking this authority.



LeMay Flies YB-52

Stratofortress Air Command's Gen. Curtis LeMay (second from left) stands near the YB-57 Stratofortress right as he is being hoisted by a hoist net to Boeing's Seattle, Wash., plant. At far right is William E. Bond, Boeing senior vice president. Also shown are the three vice presidents who accompanied the flight left to right: Richard Leach, Lt. Col. Gay M. Townsend and Capt. John Elrod.



UAL Receives Its First DC-7

United Air Lines' flight crew examines the first of 25 Douglas DC-7s ordered by the carrier shortly after it left the manufacturer's Santa Monica, Calif. plant May 29. UAL plans to complete roughly 200 aircraft.



CONVAIR C-131A SAMARITAN aeromedical transport is produced by the San Diego Division for Military Air Transport Service.



ELECTRIC LIFT can hoist two litter or 500 lb. of cargo smoothly through wide door.



REAFFIRMATION COMBINATION inside C-131A. Quickly detachable seats face forward.

Mercury Plane

- Convair delivers first of 26 C-131As to MATS.
- Each Samaritan carries up to 27 litter cases.

Military Air Transport Service has added another major step to its domestic aeromedical evacuation fleet with the recent delivery of the first of 26 Convair C-131A Samaritans.

The C-131A is a version of Convair's commercial 440 transport. It is a 255 mph airplane capable of handling varying combinations of up to 37 seats or 27 litter and seven men. Seats face backward.

• Crew of Three—Each Samaritan carries two flight attendants and two medical attendants and a crew of three. Chief mission of the aircraft is to deliver patients from ports of entry to hospitals of destination throughout the U.S.

On the delivery field, the C-131A, now named from San Diego, Calif., where it is being built, to Washington in 3 hr. 10 min. The 2,530 sq ft flight strength 399 seats, without its two fuel tanks, weighs 15,000 lb. or the equivalent of 35 litter patients.

The C-131A is the first pressurized two-engine air evacuation transport as developed by MATS. Its commercial counterpart, the Convair 440, already has logged approximately 10 billion passenger-miles throughout the world.

• Loading Apparatus—Crews might of the C-131A at 45,000 ft. It is powered by two Pratt & Whitney JT3D-9 engines. Service ceiling is more than 24,000 ft. It cruises at no less than 15,000 ft.

Because of the airplane's size, large, hydraulically operated door, hinged at the top and installed on the left side

of the fuselage at the rear for loading and unloading patients. A standard Convair C-131A, modified to carry the Samaritan, is located on the right side forward of the wing.

There are provisions for carrying men, litters and special cargo equipment. A men's table is equipped with medical supplies and food.

• Monthly Rate Low—MATS officials pointed out during delivery ceremonies at Washington National Airport last week that during the Korean war more than 95% of combat casualties were admitted to the U.S. for specialized treatment. The monthly rate of American wounded was less than one-half that of World War II.

Only two out of every 100 injured fighting men in Korea died as a result of their wounds. In World War II, the average was eight out of every 100. MATS planes brought back more than 67,000 patients from the Far East during the Korean campaign. Since MATS was formed in June 1949, its planes have logged more than 750 million patient miles.

B-26s Give French Edge in Indo-China

U.S. aircraft, furnished to the French under the Mutual Defense Air Materiel Pact, are playing a decisive role in the ground battle for Indo-China.

This is evidenced by the recent tip to Washington by Gen. Paul Ely, French chief of staff, to request additional aid, particularly aircraft. Following an visit, Defense Department announced that 25 additional B-26 light bombers would be furnished to the French.

Major factors in keeping have been the major factor in keeping change. Disasters in French forces. More than two French divisions have been surrounded by Red Vietnamese forces captured in five days. The surge of Dien Bien Phu has forced sharp action in the ability of aircraft to supply beleaguered forces and provide the link to the Red coastal positions.

One fact is pertinent: U.S. will furnish whatever equipment is needed, especially aircraft, to keep Indo-China from falling to Red forces.

President Eisenhower described the Southeast Asia area as one of "true worldwide importance." Secretary of State John Foster Dulles, in a major policy speech last week, said "South-east Asia is the so-called 'Red Bowl' which helps to feed the already opulent and voracious Red forces in Indo-China."

It is not in man's power to maintain such a war, and neither man nor machine. It is often referred to as a political war, not a military war, and neither man nor machine.

U.S. determination to furnish aid, primarily to keep Indo-China in the Western orbit is clearly evident. Dulles says "Under the conditions today, the imposition on Southeast Asia of the political system of Communist Russia and China, would be a grave threat to the whole free community. The United States feels that this possibility should not be ignored, and that it should be met by united action. This might involve serious risk. But these risks are far less than those that will face us in a few years from now, if we do not act by united action."

Western leaders, under the Mutual Defense Air Materiel Pact, are playing a decisive role.

Gen. D. P. Wyland, Far East Air Forces commander, visited Indo-China last month, was briefed on the situation by the military assistance advisory group and arrived the next day.

First mission was to send 12 B-26 light bombers to the French forces there, and to furnish 300 mechanics and technicians plus the necessary equipment and supplies. The 12 B-26s were furnished. The mechanics and technicians came from FFAF units, and are based at two air bases in Indo-China.

"In both cases," Gen. Wyland said, "they are for the specific purpose of giving training and assistance to French air force personnel in the construction of B-26 and C-47 aircraft, and as well as in the repair of them. This group is scheduled to return in June."

• Transport Support—Obviously, it is necessary to give logistic support to the Air Force personnel in Indo-China. Wyland added "As a result, the 10th Air Division has received its request for transport support to include Indo-China. This extension of the course serves counts of two. It allows the C-131A to be used from Indo-China to the Philippines and to Indo-China. In the meantime, the MACV in Indo-China, C-131A has been designated the primary transport (used for transport) function."

USAF officials in Washington declined to reveal the number of aircraft that had been sent to Indo-China since the dispatch of the first 12 B-26s. However, C-131A and C-47s are being sent in the supply of French divisions surrounded at Dien Bien Phu. In Communist ground forces.

USAF Takes Action On Airline Fuel Bills

Air Force is taking sharp action on collection of fuel bills to airlines, spurred by a Senate Armed Services Subcommittee charge that USAF is not fully aware of which airlines are AF customers and how much. Delinquency bills

have been kept "in check" and gas accumulated.

"We made an effort to find out what happened to air carriers when they became delinquent in payments," Sen. Ralph Flanders, chairman of the subcommittee declared, "and we found out. Nothing happened to them. Although they had not paid for gasoline consumed, the Air Force continued them to continue to purchase gasoline and other materials on credit."

Heating disclosed: • USAF estimates its known delinquent accounts for fuel purchases by airlines at \$60,000.

• There is doubt that USAF will be able to initiate payments for fuel purchases since July 1, 1951.

• Airlines operating under transport contracts with the Air Force are permitted to purchase gasoline on credit at any of USAF's air bases throughout the world.

• Airline Industry—Lt. Gen. White, Assistant Secretary of the Air Force for Management, says a directive is being issued to the office of the Air Force Civilian. "In fact, it is not correct to say months there is no other place in the chain in which to get bills to airlines that may be paid up."

"I am also going to have a check on the collections which were under contract during the period before July, and we may have to rely to some extent on their honesty to find out whether or not they are, as the Air Force World Service did, that they are not."

For American Airlines, the outstanding debts, reported USAF, do not tell it for its full picture. USAF did not know the airline made it was known and was unable to locate its records. Apparently the airline had been destroyed in the belief that the account had been paid and audited.

• Problems—White reports that USAF has advised one of the two problems involved in the situation. It now knows what airlines owe money.

Fuel purchasing and selling formerly was handled by the Air Materiel Command at Dayton. Required accounting procedures were introduced when fuel was set up on a state fuel loan basis. Italy, administered by the Mediterranean, by Air Materiel Area.

The task was White says is stepping up the procedure for making collections.

If no more account is delinquent, Whitehouse AMA gives the airline a 10-day notice. If payment is not made in the 30 days a more stringent notice demanding payment in 15 days is made. After the account is forwarded to Air Materiel Command, from there to the USAF Finance Center in Denver, and finally to the General Accounting Office, Department of Justice in Washington, D.C.

Light Fighter Stirs Design Controversy

- U. S. and British views on lightness differ.
- But so do our ideas on aircraft's mission.

By David A. Anderson

One of the hottest airplane design controversies of recent years has centered around one simple question: What do we want by lightweight?

To American designers, developed as drawings for fighters which fly the scale at the 30,000 lb. mark, anything under 15,000 lb. is feather light.

To AFM Lt. Gen. James Marshall, NATO air deputy, a lightweight fighter should weigh in at about 5,000 lb. empty. That is the specification figure he has approved for a new ground-support plane to bolster NATO airpower.

The newest contemporary approach is Lockheed's new F-304 listed in the USAF book as a day-superiority fighter. Among other firms, General Dynamics has announced that they are a lightweight fighter in the world, and North American and Northrop are reported to have projects under way.

The basic idea is simple: Build the minimum fighter that can outfly as well as outfight anything the enemy can put in the air.

Fast Span. The real design started a year ago, with a group of national NATO-Airies now testing the light fighter design through the long corridors of the Pentagon.

Strip off the scales equipment, they demanded, and get us a fighter that can outfly the MIG.

Take all that extra weight out of the Sabre, they asked, and we'll tackle the Reds at 50,000 feet.

The Pentagon view was that anyone that plans couldn't see the forest for the trees. They were naturally concerned with how they saw the Reds and perhaps forgetting that they might not always be fighting under Korean green skies.

Then the ingested Sabre came along—with more thrust and the 6-1 wing—as part of the treaty. The war ended a while later, and the final business was worked out at about right-to-see in favor of the USAF.

So the light-fighter controversy was started.

Rekindled in Europe—Today the argument has popped up again, but as

Questionnaire on Day-Superiority Fighter

This is the questionnaire American West sent to leading U. S. aircraft firms, to determine thinking of engineers on the requirements for a day-superiority fighter. The number of engineers or teams favoring each approach is given after the individual items.

Assume the need for a day-superiority fighter. There are no design restrictions on powerplant, weapons or configuration. Top speed is to be Mach 1.2 to 1.5. Plane should be capable of maneuvering at 60,000 to 70,000 ft. Vertical climb after takeoff is desirable. Endurance is one hour. The fighter should be equally effective against enemy fighters and bombers. Quantity production is assumed.

With these basic requirements at a guide, please check the proper items.

Reasonable gross weight would be:		Subsonic speed with wings:	0
Under 10,000 lb.	0	Other	0
10-15,000 lb.	4	Weapons would be:	
Over 15,000 lb.	16	Machine guns	8
		Canons	10
General armament layout should be:		Guided missiles	9
Single wing, with tail	2		
Single wing and tail	10	These "extra's" would be included:	
Double wing, tailless	7	Ejection seats	10
Delta, tailless	4	Engine apertures	10
		Refuel probes	14
Powerplant would be:		Forward armor	2
Turbojet with afterburner	11	Rear armor	2
Rocket only	0	Self-sealing tanks	1
Rocket only	0	Defensive systems for eye	1
Turbojet, afterburner, rocket	4	Power-driven canopy	2
Rocket plus turbojet	1		
Other	0	General construction would be:	
		Designed for heavy weapons and	
Power installation would be:		aircraft (heavy gun program)	1
Based on engine	12	Conventional canopy position	12
Pushed	3	Other	2

a new game. Now it is featuring a ground-support aircraft designed to a specification approved by Gen. Marshall.

Two British competitors and the French firm are hot on the trail of a possible contract worth about \$100 mil.

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in drawn from a Special Weapons Development Fund appropriated by Congress last year.

Potential Aircraft, with W. E. W. Potter's Gasd Dynamics, and A. V. Bee & Co. with a new delta design based on their T67 research aircraft, are the British pair. In France, Saurat offers the Broussard, a delta-shaped ground-attack plane of considerable promise and lightest performance.

Light Fighter Spec-Hunt's war Nord's spec also is:

Performance: Mach 0.95 for about one hour of mission, 500 knots for the remainder; size of 100 to 150 sq. ft. at Mach 0.9; at sea level, takeoff from a grass strip to clear a 90-ft. obstacle within 3,000 ft.

Armament: Fixed 20-mm. cannon with 200 rounds and three 30-mm. cannons with 120 rounds, or 12 fifteen-caliber plus two 500-lb. bombs plus two machine guns.

Equipment: Pressurization and anti-G seat, radio, heating system, UHF, DME, and DTF, gyro compass and radio night, and other.

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• Weight: Not to exceed 5,000 lb. empty.

Seated seats the plane is to be simple and rugged with any maintenance as it can operate at high altitudes from second-day seating.

• Difference in Kind—Many engineers agree that "light fighter" is not the correct term.

To some advocates of the type, it connotes a stripped-down version of a contemporary airplane. (Incidentally, perhaps one of the reasons North American bowed in stopping a Sabre was because they laid trail at the Mustang in World War II, to produce the P-51B. The plane weighed under 5,000 lb., but it cost a lot of money to get to that figure. There was a lot more involved than the simple removal of extras.)

To others, a light fighter is a small fighter, produced and used by the big dogs to harass the enemy, like a cloud of ants.

Majority agreement seems to be a definition based on the mission. That's why the term "day-superiority fighter" seems to fill the bill. By implication, the class of aviation gear necessary for all weather operation is left out, and the structure is lightened by the amount that would be easy to carry extra equipment.

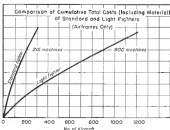
Typical Design—Most considerations of the day-superiority fighter have used the Lockheed as a typical example. This is due primarily to Potter's dogged determination to be heard and heeded. The case arguments on outstanding and unique design approach, any American engineers who have had a chance to study Potter's preliminary data for the plane.

In this country, many of the technical backing for a light fighter has come from the plan at Douglas Aircraft's Ed Heinemann for simplified design, which, another facet of the many-sided question. His philosophy, as reported to be approaching tangible form in the Douglas A-4D, informally christened "Hush-3" and "Hush-4."

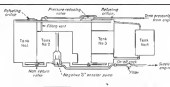
But other than Heinemann, there has been no real spokesman for the light fighter type on this side of the Atlantic.

Survey Conducted—Several aircraft design engineers at a recent West Coast, American West sent a survey of design engineers in 16 leading U. S. aircraft firms. The purpose is to find if there was any agreement among designers about the characteristics of a day-superiority fighter.

The questionnaire was that: "Assume the need for a day-superiority fighter. There are no design restrictions on powerplant, weapons or configuration. Top speed is to be Mach 1.2 to 1.5. Plane should be capable of maneuvering at 60,000 to 70,000 ft. Vertical climb after takeoff is desirable. En-



PRICE TAG for 900 light fighters would be same as for 215 standard fighters.



FUEL SYSTEM for proposed light fighter illustrates possible simplification.

durance is one hour. The fighter should be equally effective against many fighters and bombers. Quantity production is assumed.

Technical questions applied to the questionnaire, in several cases, more than one design needed the question, so that the maximum number of answers to any single-answer question was 36.

One company stated that top-level engineering opinion believed such a fighter to be unlikely because there was no USAF requirement for that status, they did not return the questionnaire.

Specifications were negotiable in three cases, according to the return. One designer stated that it was impossible for a fighter to be equally effective against fighters and bombers. Two agreed that vertical climb after takeoff was not optimum, one of the two felt that a seven-degree flight path would be the better answer.

Composite: Phase-Hunt is the composite of day-superiority fighter characteristics as required by this country's top design engineers.

Armament layout would be a swept wing and tail.

Powerplant would be a turbojet plus afterburner, burned in the turbine.

Armament would be unguided rockets, with cannon and guided missiles a very close second choice.

Reasonable gross weight would be over 15,000 lb., and the majority felt that the gross could be kept between 10,000 lb. and 15,000 lb.

Construction would be by conventional contemporary methods, only a few favored dropping into the heavy press program.

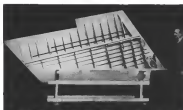
Equipment would include a radar gunner and an ejection seat. Seven felt that escape capsule would be necessary, and that most number felt that ejection systems would be needed in the second.

This description sounds like many fighters in service today. The big difference lies in the performance. Apparently the designers plan to strip up performance by weight reduction and thrust increase.

It is interesting that the majority



GRAY VS. SABRE: Seen are proposed U.S. and British fighters.



PROTOTYPE GNAT WING shows the stiff construction advocated in brief note to produce that the integral structure now being designed into many aircraft.

devise conventional ideas, there were no ideal design approaches. About the farthest any of the sources devoted from expected choices was in the naming of a new tool as a weapon by one engineer, and the choosing of a combined concept of tubestay plus support by two designers.

► **Pettit's Case**—On the other side of the Atlantic, work is progressing rapidly on the Pettit-Gnat, an ultra light type of fighter, first offered as an interceptor and now being treated for ground-support duties.

Designed by W. E. W. Pettit, who laid out the Canberra for English Electric, the Gnat is nearing completion and first flight. Specifications have appeared in this magazine (Aircraft Week Mar. 1, p. 23 is the most recent listing).

Pettit's design data and ideas were shared in great detail in a lecture he gave before the French Association of Aeronautical Engineers and Technicians last June. That lecture stands as a high-water mark in presentation of the techniques that make light and fast airplanes.

Pettit recorded that a third amount of money buys four as five times as many light fighters as it does heavy ones.

His basic argument numbered two fighters to be compared. The small fighter weighs 3,500 lb and the "conventional" design weighs about 16,500 lb.

Both are assumed to have a only two load of about 1,100 lb. The weights apply to the base airplane without armaments or taking into account auxiliary fuel.

► **Production Cost**—Pettit assumed that about \$17 million was to be committed for production of either type, and solved for the number of each that could be built for that fixed amount.



FUSELAGE BULKHEAD for Pettit-Gnat is built up from pressed sheet plate. No flanges or stringers are used in this monocoque.



FORGED FITTING for Gnat combines wing/fuselage connection, landing gear attachment point and rear attachment support in single piece, as contrast to the several fittings usually required for these jobs.

Expensive with quantity production of aircraft parts is the key to graphs of man-hour and dollar cost of the two types. Pettit concluded that although the conventional fighter is three times the weight of the light fighter, the same investment in man-hours will produce five times as many small planes in terms of total cost, the ratio is somewhat better than two to one.

For \$17 million, Pettit says that 900 small fighters could be built; the same money would only buy 215 large planes.

► **Structural Design**—Pettit claims that structural weight of the light fighter could be about 50% of the gross weight instead of the more common ratio near 55%.

One way to achieve this low figure he sees, is to design the wing as a thin and efficient combination, clearest and easier to produce than the integral types of structures that is now being advocated.

Another way suggested by Pettit was to combine what is usually a group of subassemblies into a single part. The idea chosen to illustrate this philosophy is a composite forging which houses the wing/fuselage connection, carries the landing gear and provides the wing attachment.

A typical fuselage bulkhead designed with lightening is said would be made largely of pressed sheet parts, instead of bulkhead assemblies with forgings and castings.

► **Equipment Savings**—Pettit also argues convincingly that the systems of airplanes can be designed monocoquely simpler. He cites examples of hydraulic, fuel and pressurization systems.

The fighter seat was subjected to the critical Pettit eye, and weight was reduced by three approaches: "good engineering design", using a measurable velocity suitable for fighter, rather than a ground purpose high velocity necessary for larger airplanes; and finally the discussion of what Pettit called "fools", such as the provision for ground adjustment for changing the height of the seat instead of using the gear system for raising the level of the seat in flight.

► **Simplifying Up**—There are two schools of thought on the approach to a light fighter design. The reason they are different is the same reason that British and American fighter designs have of late been different.

One philosophy has been to design a long-range airplane. This leads to questions of pilot comfort, and the plane going long.

The British have shown stuck to short ranges. A pilot gets less oxygen suitable in 15 minutes than he does in four, and in combat conditions can be a little more space in the British designs.

But that doesn't explain all the differences.

Designers in this country have had to consider all-purpose airplanes, ready to fly and fight in single or multi-mission. U. S. airplanes have been required to scoutposts on one day and break a freight yard the next day.

For as they say, designers cannot solve an all-purpose package, such as little as a single-day airplane.

That means to be the crux of the "light fighter" controversy.



technical bulletin

a New PILOT SEAT ACTUATOR

... that can be made to your exact specifications in

1. Length of stroke
2. Speed of stroke
3. Spread between jacks
4. Operating load
5. Mounting dimensions



Electrical Engineering and Manufacturing Corp.

4612 West Jefferson Blvd.
Los Angeles 15, Calif.

Another new product from the design department of EEMCO is this pilot seat adjustment actuator that can be made to your exact specifications in listed sizes. With a weight of only 7 pounds it will handle an operator seat load of 250 pounds and more. The compact control box, only 2 1/2" x 4 1/2" x 6 1/2" in size, contains the small and powerful EEMCO motor for driving the two jacks as well as the clutch brake, limit travel switches and noise noise filter. The two jacks are coupled for synchronous and movement. The actuator illustrated has the following specifications:

Operating load: 250 pounds
Voltage required: 28 DC, Amps: 8.5
Stroke: 4.625"
Speed of stroke: 75" per second
Ultimate static tension load: 6500 pounds
Ultimate static compression load: 1500 pounds

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Now in production, the C-119 power military order



AA Stresses Rigid Cost Control

Biggest U. S. domestic airline credits postwar growth to close economy, forceful sales, modern equipment.

By Frank Shea, Jr.

Modern equipment and forceful sales prospectives built around a program of rigid cost control in the formula used by American Airlines to maintain its position as biggest of the "Big Four" domestic trunklines.

Last year the formula paid big dividends, as Americans recorded the biggest earning year in its history (Avarian Week, Mar. 1, p. 7). Here are the year-end figures:

- Total revenues set a new high of \$108.3 million, an increase of \$12 million over 1952.
- Net income hit \$13,411,091 after taxes, compared with \$12,514,485 for 1952. This is equivalent, after preferred dividends, to \$1.85 per share of common stock, compared with \$1.72 for 1952.
- Passenger load factor dipped to 67.7% from 72.5% for the previous year.
- Operating expenses amounted \$79.9 million to \$104.8 million.
- Cost per revenue ton-mile ran 44.8 cents, a fraction lower than 1952's 45 cents.

New records were set in all categories of traffic:

- Passenger miles went over the 3.25 billion mark for a 13.5% jump.
- Aircraft postwar sales topped the 1952 figure by almost 50%.
- Cargo ton-miles rose to a total of 61,941,000, including 54,659,000 ton-miles of freight and 7,282,000 ton-miles of express.
- Cost Control—Continued single factor

contributing to the company's success in the rigid cost-control program, American officials say. Last year, cost of available ton-miles declined from 30 to 27.6 cents, and indications are that some of a reduction will be effected this year.

"We believe in getting the most for our money," W. J. Hagen, senior vice president for finance and planning, told Avarian Week "and this means controlling every dollar to see that its applied where it will do the most good."

Economy of operation is stressed throughout the airline's system. Until recently, budget and cost control had such a strong hold only at top management level, but now AA maintains such areas at all regional sales and operations offices.

"The best way to effect economy," says Hagen, "is to get right down to the very roots of the spending-making every member of the organization cost conscious."

Close Contact—American top management maintains a constant close working relationship with personnel at its vast route network.

"Frequently during the year," says president C. R. Smith, "several of the officers and myself visit principal points in the system—making personal contact and discussing actual problems."

The only way to make intelligent management and policy decisions is to keep close contact with the operational level. This has paid off for American in increased operating efficiency throughout the company.

Equipment—American always has stressed the design and purchase of new improved equipment. It was the first airline to place the Douglas DC-3 in service and also was the first to replace this first with DC-6s and Constans.

American AA took new introduction of the DC-4B. In addition, it is the only trunkline operating the DC-4A cargo plane.

Most recent and one of American's most significant fleet replacements is the introduction of Douglas DC-7s, placed in operation several months before any competitors.

American has purchased an initial fleet of 25 DC-7s for delivery by mid-1954. The 21st of the group was delivered recently. The investment is 25 aircraft, including required spares, is \$33 million. In deference to the DC-7's, it is the largest single fleet order the airline ever has placed.

The major production rate for such a fleet was the factor that the airline industry still has a long way to go to reach its full potential. Officials feel that performance characteristics of the DC-7—in 365-mph speed and its quiet, comfortable ride—should help substantially in hastening the growth of the industry as well as the expansion of American's traffic.

With this replace, the company looks for expansion of standard services used largely by businessmen, providing convenience of additional floor-cargo equipment to expanded coach service.

Costs—Travel—American admits there has been some discussion of traffic from standard services to lower-priced, standard service, but officials say the introduction of tourist travel has nullified them to top additional markets.

"We are becoming more and more a carrier of travel for the general public," says Hagen.

He points out that whereas standard-



AMERICAN AIRLINES new organizational chart design top management into four administrative units, American's responsibility.

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four trails, largely a composite of its
structure, coach travel is largely pre-
pared, with a very high percentage of
placemat.

Within company only 10% of
American's standard fare customers, but
only 40% of coach customers. The
company says that new coach passengers
are, on the whole, drawn from lower
income groups than standard fare pas-
sengers, the company having fairly as-
sured of less than \$1,000.

Coach travelers are younger and in-
clude many more married, clerical and
service industry workers—a large number
making their first flight, American re-
ports.

While coach traffic has had its ad-
vantage effect in stimulating traffic, it is
not without its pitfalls, Hagan explains.
Because it is comprised of a large
percentage of placemat traffic, it peaks
heavily in the summer months, making
it difficult to maintain a satisfactory load
factor on flights.

Since it is largely personal travel, it
will likely fluctuate more with changes
in general business activity, says Hagan.
◆ **Depreciation** Depreciation benefits is quite significant concerning growth
of American and the airline industry on
the whole over the next decade.

This optimism is based on continued
increase in population, a more sta-
ble, younger generation coming into
the travel market, continued decentrali-
zation of U.S. industry, shifts in
population and shorter working hours
resulting in more leisure time. All of
these, says Hagan, should stimulate air
travel greatly.

◆ **House in Order** American profits
rest on "keeping its house in order."
Essentially, this has been the chief
factor in the carrier's extensive cap-
ital program and is the main reason
the company was able and able to
finance DC-7s when the transports went
into production.

"We made provision to have DC-7
delivery integrated with that of our old
liners," says Hagan, "but they
were not immediately financially able to
accept them. That's why we got the
competitive jump on everyone," he
points out.

◆ **\$170-Million** Climb—Flight equip-
ment owned by American at the end of
the war had an original cost value of
about \$170 million. By the middle of
1954, officials estimate that it will be
\$45 million—an increase of more than
\$150 million in new years.

At the beginning of this period, de-
preciation charges were small, less than
\$2 million in 1945. This permitted AA
with a new million tank of financing.

Starting with a net worth of \$10 mil-
lion, the airline raised \$30 million
from the sale of debentures and pre-
ferred stock. Depreciation itself began
to increase rapidly, and today the com-
pany finds itself in a much different
position.

Plans call for the present equipment
program to be completed within a few
months. Hagan says provision for de-
preciation will be at an annual rate in
excess of \$20 million. He estimates that
"with continuation of reasonable sav-
ings," AA will be able to keep itself
in a position to handle any equipment
program that might develop.

◆ **Jet Expenditure**—If jet transports are
purchased within the next few years,
American feels that first order will not
be for fleet replacement but merely will
add planes to the conventional stable.
The original jet program may not repre-
sent any greater expenditure than that
of 1933 and 1934, which totaled about
\$70 million, says the company.

Officials indicate they are keeping
close watch on Boeing's 707 jet trans-
port, with evaluation being given for
quick entry to the plane builder's de-
sign plant.

Below widespread introduction of



New Allison Jet Gets Aerial Workout

Allison's flying outfit for its new JT1
turbojet engine makes the runway at Ed-
wards AFB, Calif., where the engine is be-
ing tested prior to use in the Douglas B-45
bomber and McDonnell F3H Phantom.

Flight This flying outfit is a modified
North American E-45C Tomcat. The jet
bomber, carrying the JT1 engine in both
the JT1's structure, into the plane's back-
bay. The powerplant has 9,000 lb thrust.



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No-load—10 mv or less

MOTOR DATA

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ply on America's roads, however, serious problems must be solved. Big quantities in the month of AA's inauguration. "Can we operate a jet economy only within the present fare structure?" Often nagging problems from the airline's point of view.

- Increased rates that jet transports will introduce, possibly leaving open tears from some nonjet airports
- Traffic control in high-density areas. Also, says Hagen, "Will the airlines be able to afford the cost?"

He points out that a \$4-million expenditure for jet aircraft would require an additional \$15 million for spare parts. "Quite a chunk of money," he observes.

• Current Finances—America's jet north has increased from 557 million at the end of 1948 to 592.6 million in September of last year. Eased expenses went from \$4.5 million to \$19.5 million in the same period.

Long-term debt was about 40% of invested capital. Today it stands at about 24%. During each of the last five years, AA has converted more than 6% of its revenues into equity after tax. The average has been 6.9%.

American currently is using a new approach in introducing newliners: research and expense are included as it is to avoid a miserable squandering rate holding a 10% margin after taxes to be reasonable. Thus, says the company, minor fluctuations in income and expense will not have such disastrous effects on earnings.

"This approach," says Hagen, "has the additional advantage of eliminating certain constraints and litigation as to what the allowable investment should be in running at a safe pace."

"So far, high load factors and high levels of equipment utilization—plus higher aircraft have enabled us to do with increased operating costs and show an improved profit each year."

"Currently, load factors and rates of equipment utilization are returning to previous levels. Whether the current low fare can be continued will depend on our growth in 1956, the degree of further rise in expense and general effectiveness of our controls."

• Readjustment—America hopes to see planes in its future growth through the recently effected readjustment of its administrative setup, whereby authority is decentralized and increased responsibility is given officers in the field. (Aviation Week Mar. 15, p. 125.)

Increased operating efficiency is anticipated through a grouping of administrative departments into one unit under a senior vice president (see chart) and reducing duties of officials for better coordination.

Regard change in the organization of a company action department to handle passenger and cargo service

under vice president R. E. S. Decker: "This will be a staff department which will establish the policy and standards by which America will provide service to its customers," president Jacobs says. AA is believed to be the only airline with a department devoted exclusively to such activity.

Only department not changed under the reorganization is public relations. Rex Smith, vice president for public relations, continues to report directly to the president.

Hughes Files Damage Suit for Flying Boat

Long Beach, Calif.—A claim against the city for \$12 million damage to the Hughes flying boat and other property was filed by the Aircraft Division of Hughes Tool Co. here last week.

The flying boat was damaged last September when an earth slide, caused by a dredging company employed by the city of Long Beach, broke (Aviation Week Sept. 24, p. 145). Heavy work, lift, sand and water crashed the plane against adjacent structures and kanger.

The statement of claims cited big grounds of liability, including, "negligence and carelessness" in the construction, supervision, operation, and design and guarding" of the Long Beach harbor dredging and construction work.

The company said it is continuing to spend approximately \$5 million a year on the reconstructed runway project.

Boeing Awards Five B-52 Subcontracts

Subcontracts for second-source B-52 production at Boeing Airplane Co.'s Wichita, Kan., plant have been awarded.

Successful bidders and the sub in which they will manufacture are: Avco Aircraft Co., Wichita, harnessing installation; Bell Aircraft Corp., Buffalo, N. Y., jet engine nacelles; Consolidated Valves Aircraft Corp., Ft. Worth, Tex., calibrated wing panels and vertical fins; General Aircraft Corp., Dallas, Tex., fuselage sections; Avanca Aircraft Corp., Middlebrook, Ohio, radomes and elevators.

Assemblies involved in the first contracts represent 25% of the gross airplane weight, according to Wayne W. Perkins, outside production manager at Boeing Wichita. The contracts are exclusive of orders placed by Boeing Seattle.

Contracts are for tooling, production assemblies and a small number of production machine tools. Funds will be required for building construction by the five firms, Perkins says. Boeing plans to award additional B-52 subcontracts in the near future.



LAUNCHING PLATFORM for B-40 Matador is positioned for loading aboard C-124

Missile Dons Seven-League Boots

An unsurpassable capability of major units of the Materiel R&I Center is the position up USAF's ability to place the jockey role-controlled bomber in operation anywhere in the world at relatively low cost.

These photos show a Douglas C-124 Globemaster transport being loaded with a Matador missile launcher at the missile makers Babcock, Md., plant prior to being flown to an destination. The B-51 also is in the background.

Recently USAF Tactical Air Command moved two Matador-equipped squadrons and has sent one of them to Germany, the first overseas deployment of a guided missile unit.

The largest powered Matador arrives at approximately Mach 0.9, then onto its target at supersonic speed.



MATADOR on loader, ready to fit



DOUGLAS C-124 releases Matador's mobile launching platform with crew to spare

Is 32 the 'Witching' Age? A Hostess Says 'No!'

By William J. Coughlin

Los Angeles—We have just had a look at a document with a higher security classification than the Russian atomic energy plans. It is a list composed of American Airlines stewardesses who are more than 30 years of age.

As you know, American decided to ground all its stewardesses as they reached 31. After a large howl of protest and much publicity, the airline now comes up with the list of heretofore superannuated that those of 32 and thereabouts already flying can continue to do so while a "joint study" is made. (Overseas News, Mar. 19, p. 62). We predict they will feel some sheepy pangs. But the company insists that the young residents it hires from now on will be grounded when they become old ladies at 31. All first residents for a great few. Most of the dues is coming from women who are 30 years old and up.

Our wife reacted that we just had plenty for some years, which we do not understand since she tells us she is 29—an age which she has been for several years.

► **Discrimination.** Nevertheless, we are caught in a predicament the other side of which one of the few women we ever met willing to discuss her age as an American Airlines stewardess first approached the dead line. She reacted not to be Miss Annette Benbrook, a very determined young lady who also objects to the idea that she soon will be fit to fly on anything but a broom.

Miss Benbrook is 32 fast today, eyes of Miss Aeri obviously she is a member chairman for American Airlines stewardesses, who are members of the Air Line Stewards and Stewardesses Assn.

The first thing Miss Benbrook wanted to make clear is that she is not 30. She will not be 31 until May 11. Now this may seem like trifling hairs to you but when you

are employed by American Airlines it is a very critical distinction. As to other vital statistics, she weighs 114, wears a 7AAA shoe and a size 10 dress. Tall, waist and hips are slanted.

► **Witches and Chicks.** Miss Benbrook, who commutes between Los Angeles and New York on one of C. B. Smith's sweepstake DC-7s, voiced her opinion that American Airlines should judge its girls on merit and personal appearance, not on age. A stewardess over 30, she points out, often is better looking than her younger cohorts and undoubtedly larger for head better in an emergency.

"We have some girls who look like witches," she admits, "and we also have some cute young chicks who don't give two hoots about what we are doing for the passengers."

We know some American Airlines publicity men who won't give two hoots about Annette Benbrook after that statement.

"If American insists on setting an age limit," she says, "then let them put stewardesses on probation at 32 too as they are when they first start to fly. If they don't come up to American standards, the company can ground them. But it is unfair for American to expect that when we reach 31, we will become unattractive, ugly and antiseptic. It's up to the individual."

► **Popout.** If the number of girls flying will tend to grow as Miss Benbrook in the Hotel Statler her during our interview as any indication, she is one individual who would pose such a test.

As a matter of fact, she secured a proposal of marriage from Florida after her photograph appeared in the newspapers as among the 64 American Airlines stewardesses affected by the new ruling.

We find that her reply was somewhat of a reminiscent direct in regard to a proposal and herewith quote

it in full for any other young ladies with similar problems.

"Dear Mr. Frank:

"Thank you for your letter of Feb. 23, showing an interest in our problem of the American Airlines' stewardesses being released from her job when she has reached the age of 31.

"As spokesman for the Air Line Stewards and Stewardesses Assn., in formation, and member chairman of American Airlines, I know that we have a lot of work to do before we come to a solution. Public opinion has been in sympathy with the stewardesses, so we may yet establish our viewpoint. Truly yours, Annette T. Benbrook, Member Chairman, ALA."

We think it takes a very bold ass to come to a girl who answers positively in such a letter.

► **A Warning.** And we wish to warn the profession responsible for American's decision. The girls know who you are, and we would not care to be in your shoes. For hell hath no fury like a woman superannuated.

We are glad to see you have bowed to public demand and voluntarily temporarily at least—the girls over 31 who want the other standards, picking up a few more headlines tomorrow. For Americans always pass the public the mirror of distress.

So Stewardess Delegate of the San Francisco Chapter puts it: "I do not want my young Elizabethan/Elizabeth taking part in the complicated no comment of flight. I want a stewardess only with a little maturity. It is my opinion that ladies improve a great deal with a little maturity on them."

► **Sending to Live.** Miss Benbrook, who has her own ideas about the advantages of being over 30, speaks most heartily.

"A woman just really starts to understand about life, living and the male sex when she reaches age 30," she says, "rapping her Minskian thoughts."

And we cannot help wondering what the French think of all this.

course will have two classes, one for wartime pilots and the other for type.

One Benbrook to 10-8 and one Popsayer Club will be used the first year. The ministry will appoint 10 Japanese instructors.

The school will be located at a former Navy airfield in the suburb of Miyazaki City, Kyushu. The pilot

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Japan to Open First Postwar Air College

(McGraw-Hill World News)

Tokyo—According to Japan's Transportation Ministry will open this country's first postwar aviation college in July, training pilots, engineers

and navigators under a \$400,000 budget appropriated for fiscal 1954.

One Benbrook to 10-8 and one Popsayer Club will be used the first year. The ministry will appoint 10 Japanese instructors.

The school will be located at a former Navy airfield in the suburb of Miyazaki City, Kyushu. The pilot

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'Navarho' Net

- ACC seeks single system of long-distance nav aids.
- AF device offers greatest promise, report says.

An Coordinating Committee has proposed major revision in U. S. policy regarding worldwide long distance navigation systems.

New policy is based on three principles:

- To promote the development of a single system of long-distance aids to navigation for U. S. and worldwide standardization.
 - To provide U. S. aircraft with a solution to the present navigation problem with the most readily available and economical system (aids) implementation of the standardized system is delayed.
 - To support the development and evaluation of all navigation systems that will best meet the operational requirements for long-distance flight operations.
- Canada President The US-AM-developed "Navarho" system appears to offer the greatest promise as a long distance navigation aid, ACC says. Air Force is building a preliminary demonstration of "Navarho" before the International Civil Aviation Organization's Communications Division meeting in Montreal, Canada.

"Navarho" is designed to provide navigation information to aircraft for transoceanic and transcontinental flights up to 2,000 miles. It is a low frequency system operating in the international band set aside for long-range navigation aids and does not interfere with the present program for VHF (very high frequency) short distance navigation systems such as VOR, VORTAC (voice range) and DME (distance measuring equipment).

Evolution Phase-II U. S. will complete the development of the "Navarho" system and then, out extensive evaluation on both the Atlantic and Pacific coasts.

Participation of domestic and international air carrier and defense agencies will be invited ACC says. Results of the evaluation will be made available to ICAO members to promote the standardization of "Navarho" for long-distance navigation.

U. S. will observe for the present the following principles for navigation aids:

- Continued operation and expansion, as required, of the Loran system will be supported for U. S. and marine use until a new standard, long-range long distance system is adopted.
- Installation and operation of non-

derivative radio beacon will be continued where needed and where the beacon facility is adequate.

- The U. S. will provide acceptance and support of standard Council institutions based on operational requirements.
- Engineering of new additional Council aviation institutions will be directed toward potential future integration into the standardized system.
- Duplication of long-range aids will be avoided to the maximum extent possible.

House Group Fights Seven-Cent Airmail

New correspondence have challenged

a majority vote of the House Post Office and Civil Service Committee supporting the seven-cent postage rate from 10 to seven cents on letters.

The 34 members—11 Republicans and five Democrats—who supported the increase estimate it would yield the Post Office \$15 million additional revenue annually.

The majority, in objecting to the increase, declared:

"There is no certainty that the expected increase in revenue will make a difference in the postal deficit. It is said that today it is necessary to send a letter from Washington to New York to Chicago and pay seven cents, because the latter probably would more

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Reduces Equipment Susceptibility and
R-F Noise Problems in a Single Package



Is the equipment which you are designing susceptible to malfunctioning caused by r-f currents conducted through power lines? Will your equipment interfere with other equipment operated on the same power line?

A permanent electronic malfunctioning during these problems existed on Sprague Ear body with r-f and equipment which was already in production. Specifications for a single filter to do both jobs were established by the manufacturer's engineers working closely with Sprague Field Engineers. The required impedance was characterized as more than 60 db from 14 to 40 kc and more than 80 db from 40 kc to 200 mc; low voltage drop was limited to one volt max. at 1.5 amperes at 60 cycles.

Sprague engineers designed this "impossible" dual circuit has filter in a case only 5 1/2" x 2 1/2" x 1 1/2". This is not only surprising since previously designed by others in effect to solve the problem but also occupies only two-thirds the cubic space.

Once a custom tailored design such as this has been completed and accepted by a Sprague customer, mass production quantities or small runs are readily supplied with equal facilities.

For Sprague help you with your radio interference problems without obligation on your part. Write, wire, or phone the Sprague Electric Company, 11525 Washington Blvd., Culver City, California (TElex 47466) or North Adams, Massachusetts (OM 6763 3 511).

just as quickly by regular first-class mail which a new being earned by it is planned to extend this arrangement of regular first-class mail to other cities. The annual increase may even defeat itself by driving a large portion of present aircraft traffic out to first-class which, even at the proposed rate of fare costs, would be far less expensive. This would decrease annual revenue with no corresponding decrease in costs.

Congressmen who plan to carry the fight against the increase to the House from Democratic Reps. James Davis, George Rhodes, John J. Warner, William Tuck, John E. Mann, John Dondy and Hugh Alexander, Republicans from Regs. H. A. Green and Harold Hagen.

New French Budget Aids Plane Builders

(Continued from World News)

Paris-France's burgeoning aircraft industry will get a small \$1.5-billion boost from the 1954 French air force budget, now before the Chamber of Deputies.

The industry, facing the squeeze over the last three years of lean budgets forced by the financial crisis of the Indo-China war, does not have a place ready for mass production to compete with late models of North American fighters. F-86 Sabres jet in Britain's Hawkeye fleet.

► **Budget Increase**—The new \$770 million budget is only a little bigger than last year's \$750 million, and the portion going for aircraft development and production remains about the same (\$375 million).

However, production of proved models will receive \$216 million this year, against \$185 million in 1953 when a much larger proportion of the total funds went for research and plant development.

► **Mistake Made**—The big change this year in the provision of funds for production in 1954 of 175 Mustang 5bs, Marcel Dassault's most-complex jet interceptor.

This plane, normally powered by a Turbogaz 6,163 hp (theop), already stretched 800 mph in horizontal flight (Aviation Week Mar. 15, p. 319) when specially powered by an Anson engine at 9,000 lb thrust with afterburner, produced by Hispano-Suiza as a jet engine.

The 1954 budget also will pay for the delivery of 76 Stratus 30-3010s; 100 four-engine aircraft, 100 two-engine jet fighters, 49 medium transports, 67 MD-115 transports, and the purchase of 16 Meteor NF 11 all-weather fighters from Great Britain.

► **Production Data**—Information gives

Four design ideas you can use right now...



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RADIO SILENCING Titeflex flanges for reciprocating engines in our specialty Titeflex meters in wide range of standard flange diameters meeting rigid vibration specifications—can also supply custom-made parts with serviceable leads for military and commercial aircraft. Titeflex application on Wright R-1820 engine includes fuselage and leads.

FROM DESIGN TO FINISHED PRODUCT Titeflex is especially well qualified to help you with all problems of special metal hose, wiring and connections. Take advantage of the long experience of Titeflex engineers in developing high temperature fuel lines, in designing and fabricating harness and wiring systems. Write us now about your application; our nearest representative will be glad to call and help you. Or send for our new 48-page Metal Hose Catalog No. 300.

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Napier Sprays on Its Electrical De-Icer



CONSTRUCTION of heater mat, with cross-section view of columns of insulation, mat

A new electrical aircraft braking system is applied with a spray gun. Developed by the British firm of D Napier & Son, Ltd., the system can be used wherever protection is desired, including compound curves and parts too small or difficult to be fitted with other types of devices. Price is said to be competitive with other types of device, and maintenance and operation costs negligible.

Briefly, Napier's surface heater design system consists of a metal heating element sandwiched between two or three layers. First a coat of thermosetting resin is sprayed onto the surface of the airplane. Then the metal heating element is applied by spray gun to the pattern desired for required heat distribution. This heater element is fitted with terminals that are connected to the airplane's electrical system. Then a final coat insulating coat of thermosetting plastic is sprayed on and polished to comply with the rest.

► **Surface Moisture Tests**—Extensive test-

Some Typical Applications for Sprayed-On De-icers . .



Anwendung: Sublimieren Naphthalen gelb eingetaucht in Öl



E48 (Conary alternative air intake)



Armstrong Sillsby Says:As yet none doing



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Partial Differential Equations

ing, including some 1,500 hr of flight test, has been made at the agency's training system on a variety of planes, including at fighters. For much of the test, a Vickers Viking two-engine transport was modified to produce its own wing conditions on an extended section on the vertical fin.

The system has also been tried on an English Electric Canberra transport bomber, which made 100 takeoffs and landings at Khartoum, Sudan, in test missions to obscurity.

Tests covering 236 hours on a de Havilland Venom jet fighter have proved that the material can stand the effect of run cranks at high speeds and also that the equipment exposes no stress limits on the wings of planes using it, states Napier. The tests also have been used experimentally on other



Short Seaweed crabs (table)



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These instruments sold only direct from factory.

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Write for detailed literature



GUINEA FBG in test of new Naper design system in this Yehon Yikag.

exposed portions of axles and aircraft engines.

Other tasks have been made to determine the system's reliability under a variety of climate and vibration conditions. Electrical insulation and moisture resistance tests were included. The heater has been found to be unaffected by all aircraft fuels, oils and hydraulic fluids. The heater units have passed fatigue tests on resonant base, Rayson says.

The company notes that its heating system can be applied to surfaces by mechanical methods, using a spray gun. However, it is mechanically heated so the workpiece is heated so that the rate of gas of the gun across the work can be controlled. For more complex shapes a combination of mechanical and hand methods can be used.

Met Spec-Naper has made a light heater unit having a total thickness of 0.01-0.03 in. depending on the material thickness, with corresponding weight of 0.2-0.32 lb./sq. in. and an uncoated thermal per square foot.

Minimum operating temperature for the Naper unit currently is fixed at 70°C. Although the company feels that this is a waste, they are currently working on new coatings, it is announced that some form of overhead protection be installed to safeguard the unit in the event of inadvertent operation of the system in non-curing conditions.

Maintenance—Local repair to the heater units can be undertaken without difficulty, using hand-applied methods and locally available components, the firm notes. The damaged portion of the system can be removed down to the base metal, then rebuilt. The company is working on a method of emergency repair that would require only elementary facilities.

The Naper surface heater can be checked visually at cancer inspection periods. During major overhaul periods can be made of insulation and re-surface integrity using normal servicing equipment. If a full ground inspection and repair necessary, a power supply pack putting out reduced voltage is

being made available by Naper. Other Applications—In addition to its use for the protection of aircraft, Naper says the electro-thermal system is readily adaptable to other local surface-heating uses. The company expects heating of guns and instruments of military vehicles, oil tanks and pumps of piston engines.

Naper says its surface heater element is covered by several patents. The company's address: Acton, London, W. 3.

New Material May Raise Plastic Strength

A new low material combining glass strands and resins has been developed that promises big dividends in strength and labor savings in standard plastic applications. Now under evaluation with the Air Force and some aircraft companies, the material is in pilot production. It is preimpregnated and ready to mold. It consists of about 60% glass strands, 40% resin—either as epoxy or a phenolic, depending on the properties required.

Minnesota Mining & Mfg. Co.'s Vape division, St. Paul, Minn., has been working on the material for about two years. As distinguished from non-vertical woven materials, the new material is made by superimposing a number of strips in staggered orientation to each other. These strips are held together by the impregnating resin.

Advantages the material offers:

- Elimination of the weaving process in a wet bath.
- Ready to mold as received, thus saving the molder the job of layup and resin impregnation.
- High tensile strength because there is no crimp, slack or twist in the strands.

Overall strength obtained by molding the material is said to be higher than with conventional fabrics and the reinforced plastics, with the exception of 140-type cloth when laid up in a similar staggered pattern.

Ability to manufacture readily of various reinforcing double canopies.

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It's for today's high performance aircraft, it must work with positive action... with precision. That's the whole story of action by BREEZE. Years of specialization in electrical, mechanical and hydraulic actuating devices have made BREEZE a recognized leader in the design and construction of aircraft. Leading aircraft manufacturers continue to depend on BREEZE mechanisms for actuating landing gear, trim tabs, wing flaps, engine air throttle, pilot's seat, cowl shutters, antennas and other functions requiring positive motion control. Breezes has available many standard actuators to meet your requirements, and an experienced staff ready to submit new designs for special applications.



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VERCORS missile takes off from launching platform, guided by four cables from single drum, which is protected by jet exhausts.



CORSECT AMULET is lowered by drum set up which directs two lower cables. Cable drum is jettisoned at end of guidance period.

Tether Stabilizes Missile's Launching

Tethered launching is a unique feature of the French high-altitude research project called "Vernique."

Developed at the Vernique laboratory for aeronautical and ballistic research, the rocket has a design altitude of 400,000 ft.

Powergiant is a zinc-air and solid gas-lance engine which develops 3,800 lb thrust at sea level. Duration of burning is 15 seconds. Combustion chamber pressure is reported at 255 psi, and exhaust gas velocity at 6,000 ft/s.

Tether stabilization for the launch is handled by an unusual system of cables which are reeled from a drum directly under the firing platform. Cables from

the drum lead out along four runs at the base of the firing table and attach to four smaller ones connected to the base of the rocket. From the rocket extended across there are four connecting cables to the launch-away constraints near the instrument section of the rocket.

During the first few seconds of firing, the missile rises off the stand and drags out the cables. Since they all come off the same drum, there need be no coast permission for anyone cable tension.

In deflection protect the drum parts from the effects of rocket blast during missile launching.

At the end of the guidance period,

the drum lead out along four runs at the base of the firing table and attach to four smaller ones connected to the base of the rocket.

To make sure that Vernique takes off at the desired angle at the end of the guidance period, two of the four parts of the drum are profiled so that the two inner cables are shorter than the outer ones.

This system—believed to be the first use of such a scheme anywhere—has proven successful in flight tests made by the French laboratory.

Vernique is 21.4 m in diameter and 19.68 ft long. Takeoff weight is 2,100 lb. Velocity at burnout of the engine is about 3,100 mph.

THRUST & DRAG

"Holy Muck!" curses the engineer.

"Where've you been?"

"Busy," I said. "And real?"

"I've been down in Texas, getting the hardware on the guided missile business from a customer. I figured there was no such ball in the program that Texas was the place to go."

"What's the connection, other than the bad joke?" I asked.

"Well, this character compared a good guided missile to a Mafia ball that they run for bullfights only. When that ball gets going in Sunday afternoon, there's nothing can stop him. He starts out of the hand and with one thought. Since that silly looking two-legged thing across the ring. He's not pretty, but he's a born killer."

"Very neat analogy," I admitted.

"Any more?"

"Sure," said the engineer. "This Texas said that the trouble with us is that we've treated the guided missile like a pet. He's not a pet. He's a stock. Flyer, purser him, handle him with loving care, and he'll lay down in the first second. He might kill somebody if they shot and mean and he felt that he had to, but about the only damned thing he's good for in producing more of his own kind."

"And that," concluded the engineer, "is one of the most sensible things I ever heard about the guided missile program."

Speaking of missiles, I wonder if the Wright people looked at the unbridled success of a good dictionary before they let somebody figure the name of Regular in their names.

See, it's named after a star. But the dictionary says that Regular is also "... a pretty kid, a ruler of kids' power or consequence, the more or less superior mass of capital ... in nothing and nothing's own."

With reasonable consistency, the national engineering house society, The Link Co. has again defended a proposal to admit women to membership. We took up the cudgels once before on this score, and the club is still at hand.

That dream is better, sure. Think of your sons and daughters who might hear about this discrimination against their sex. Who all the fun about women's suffrage they caught?

How is well face it, sure, the women are here to stay. Some of them will be engineers. And more of them will be better engineers than you are now.

Most of them are pitiful, too—DAA

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Pilot training gained a new ally when the first Link Trainer made their how a quarter of a century ago. Invariant Flying Trainers such as the G-3 Link above, gave basic and realistic instruction in more than half a million pilots in World War II.

Like their predecessors, modern Link help to provide the same with the world's most persistent pilots. New electronic games such as the Link 3-DB Flight Simulator are giving Air Force pilots an extra training instrument tool unique of modern jet aircraft.

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aggravation of the land

Results—The blades which completed the 100 hr run were developed by Thompson Products, Inc. Jet Dynamics. The blades, mistakesman composed the complete third entry stage of the test turbine.

Inspection of the Dissimulated blades—after the test run showed that there was

Inspection of the disassembled blocks after the test run showed that they were

at completion) is ~~the~~ before molding.



44

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Dependable, ultra-fast switching makes these high-speed relays ideal for many electronic applications.



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Electronics
DIVISION**

2800 S. E. 5th Ave., Portland 2, Ore.



FATIGUE PROPERTY CHECK is given glass-plastic compressor blade after completion of 500 hr test run in hotspot. Portion of blade being seen is at bottom.

case, in the largest manufacturing of jet blades, the company felt it had to be alert to all prospects in the field. All data assessed to date will be turned over to any engine manufacturer at its request. Thompson already is making experimental plastic blades for engine builders.

► **Provable Properties**—In addition to the consideration that fibrous glass-reinforced plastics are a non-corrosive material, Thompson sees the glass-plastic blade promising many advantageous characteristics. These include:

► **Relatively high damping capacity**—This characteristic keeps their low-noise blade less susceptible to fatigue failure.

► **Low mass weight**—This blade property improves acceleration characteristics of the engine because of the resulting lower moment of inertia. Starting torque also is reduced.

► **Low creep rate**—The material exhibits practically no creep, hence maintains chosen air mass regime. In open patents filed in 1955, Thompson for 17 years there was no measurable creep in a 70-in.-dia installation (wheel plan glass blades), in contrast to steel blades, which grew 0.01 to 0.02 in.

► **High strength weight ratio**—The ma-

trix's strength-to-weight relationship is about three times that for compressor blade steel.

► **High impact strength**—Relative to its mass, the glass plastic's impact strength is equal to that of compressor blade steel.

Disadvantages of the plastic blade are seen in including its isotropic strength properties and the difficulty of adequate inspection.

► **Transparence**—Factors—Transparence limitations do not appear to interfere any significant handle. Ability of fibrous glass-reinforced plastic materials to withstand 5000 psi stress levels.

The third major compressor application is the 100 lb test run about 3000. Within the foreseeable future, plastic-represented fibrous glass blades should be able to withstand about 5000 psi for about 10 hr in a compressor blade application. This, of course, does not represent any operating condition, merely indicates the direction in which the temperature potential of the material is heading.

► **Checks**—Confusing—Manufacture, properties of the blade at elevated temperatures are undergoing progressive evaluation at Thompson's jet division, along with other checks on such characteristics as fatigue, impact and creep resistance and various strength properties.

Experiments also are continuing with spray methods, using various techniques and materials with the aim of improving ductile properties. The various production aspects of making glass-plastic blades are getting a close look.

► **Blade Molding**—The molding job for the compressor blade is even difficult than the usual procedure for forming reinforced plastics, it is reported. Close control is required in the (mold) design, of pressure, temperature and pre-poly phases. However, results are very



RELATIVE PROPERTIES OF various compressor blade materials—800° stainless, TP4 (Thompson Production standard area powder), aluminum alloy, glass plastic (fibrous glass), and aluminum alloy.

apical—surface finish and dimensional uniformity are obtained.

The molding operation begins with the dry layer, which approximates the shape of the blade. The laminations from fibrous glass-reinforced fibrous glass cloth are held together with an adhesive.

The layer is placed in a mold-and heated to the temperature to which it is subjected to a pressure forming cycle. When the molded part is in



High-precision diaphragms set new standards for accuracy, repeatability, and uniformity

► Bristol's new are welded diaphragms of extremely thin (0.001" to 0.002") stainless steel, Inconel C, and phosphor bronze are now available for pressure transducers, pressure detectors, and such for many applications in the instrument and aircraft industries.

The result of 65 years of experience in the manufacture and application of hundreds of thousands of pressure measuring instruments, Bristol's diaphragms give uniformly accurate performance under low and high temperature conditions.

The accuracy, repeatability and uniformity of these pressure-sensitive diaphragms are made possible by Bristol's specially developed arc welding processes and the use of the latest leak detection equipment. You can get the diaphragms for pressures of from 1" water pressure, full travel up to 150 psi. Write for more information to The Bristol Company, 180 Bristol Road, Wrentham 20, Conn.

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served, at about 98% complete. At this point, the dimensional accuracy is just about as good as can be attained. Flank can be finished off with the finger-stick.

A post-casing operation is required for the area in the blade to impart the necessary strength properties.

► **Root Details**—Present method of notching the blade in the wheel was designed to be as simple as possible, yet afford high reliability, so that retention problems would not enter into the blade evolution.

Root configuration itself is a dovetail made in the form of an aluminum alloy for casting, requiring no machining. It is not appreciated at present the optimum method for anchoring the blade, and Thompson is continuing to explore the various aspects of attention.

PRODUCTION BRIEFING

► **Pittsboro Helicopter Corp.**, Morristown, Pa., has listed 240,000 sq. ft. of space at the former Autocar plant in Allentown, Pa., 12 mi. from the engine firm's main plant. The acquisition, which will nearly double Pittsboro's effective production area, will be used to assemble engine components and is in line with Pittsboro's policy of reducing its subcontracting to maintain its own level of employment.

► **American Helicopter Co.**, has canceled its option to lease for another three years its lease on the 15,600-sq.-ft. Falcon Field, Ann. plant and plans to install additional piston engine testing facilities.

► **Boveri Corp. of America**, Wallingford, Conn., has opened a new plant in Meriden, Conn., dated to double production capacity 50%.

► **Texas Aircraft Corp.'s** Grovesville, Tex., facility is working on a contract to produce a "bug number" of C-47 Douglas C-47s, with completion scheduled for early 1955.

► **New Plastic Co.** has opened a larger plant at 11751 Manlyway Ave., Los Angeles 25, Calif., which will include present offices and facilities, plus room for output of a new and expanded line of dextrin phosphate molding compounds, for use in resins, GFR laminates, electronic triggering devices, solenoids, electronic trays, dimensional devices and other applications.

► **Matheson Corp.**, Inglewood, Calif., metal fabricator and maker of special sealing parts, has entered the special valve field covering high temperature, synthetic oils, acids and chemical lines.



Twice the cooling capacity, less than half the weight!

Back in 1941 AirResearch engineers anticipated that high speed airplanes would require extensive cooling. They were first to experiment in the field.

America's first operational jet, the Lockheed P-80, used AirResearch refrigeration units exclusively.

In the intervening years leadership in this field has been maintained by over 600,000 research and develop-

ment hours, and by unparalleled experience—12,795 units produced and 15,000,000 operating hours.

Today, one of the new units for jet fighters weighs only 9.5 lbs. as against 30.5 lbs. for the original model; it provides 67 tons of refrigeration against 35 tons. An improvement of more than 400%.

That is another example of how

AirResearch improves steadily efficient products. Its engineers constantly achieve higher performance from smaller units of less weight.

Qualified engineers and skilled mechanics are needed now at AirResearch Manufacturing Company, Los Angeles 45, California, or Phoenix, Arizona.

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 Bldg., Milwaukee, N. W., ext. 1,200 ext.
 323. Ext.
 B. B. Baker, Inc., 11103 Madison Ave., Cleveland
 7, OHIO 44106, William Allen, N.Y. 100
 1-200-3450.
 Leon Milwaukee, Inc., 401 14th St., Kenosha
 2, W. V. proppert group with plant.
 Leontine Tool & Mfg. Co., 2415 E. Fremont
 Drive, Los Angeles 18 Calif. 90008.
 Leontine Tool & Mfg. Co., 714 E. 14th St., New
 York 10, N. Y. and for KPMJL applica-
 tions.
 Leontine Standard Tool, United Standard
 Corp., Western L-200, Ohio, automobile
 parts.
 L. H. Lewis, 1000 N. 1st St., Milwaukee, Wis.
 53204, phone 474-1100 for name on 4225 pro-
 perty. 11103, automobile for the site on 1200
 1-200-3450.
 Wrightsboro Machine Corp., 400000 Corp.
 Verona, N.J., Lester Brown for 4225 pro-
 perty. 11103, automobile for the site on 1200
 1-200-3450.

[illegible]

Following is a list of recent USAF contracts announced by Air Materiel Command:

[illegible]

Miller-Gossens Corp. 100 W. Flagler St.
 Miami, Fla. 33101
 312
 South American Airlines Inc. Los An-
 geles International Airport, Los Angeles 900
 441-4000; main office, Suite 100, 300
 441-4000
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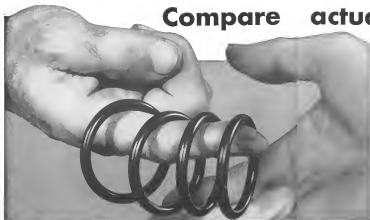
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system components

Twin Coach has what it takes
to meet schedules...

- Dr. Philip Klein

Half of the tubes removed as defective from military electronic equipment either have no apparent defect or the defect appears to be caused by rough handling during maintenance. The rest offer significant disclosures on the reliability of electron tubes in military applications are made in a recent report by Acoustical Refco, Inc., on its military-sponsored tube study.

The Aene report shows that the apparent danger, military service, and to some extent the aircraft manufacturers, must share the blame with the oil-refined tube manufacturers. Improved component reliability will depend on the efforts of all concerned, the report indicates.

• **Most Extensive**—The Aqua program, most extensive ever attempted, made good nearly half a million tires operating in 44 different types of Air Force, Navy and Army equipments at eight different bases.

The report's conclusions are based on a study of 45,000 fishes removed as defectives during the period of Sept. 18, 1951 through Mar. 30, 1993. An analysis of another 63,500 fishes removed during the balance of 1951, but not included in the present report, confirms the earlier findings, as Ames fishermen told ANIMATOR Wynn.

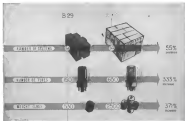
*Defects and Failures—Arzac's study showed that of 45,000 tubes removed as defective:

* One-fifth appeared to be free of defect when later tested in the lab, indicating that their owners should be charged to inexperienced maintenance personnel and inadequate test equipment or maintenance procedures.

* Dec-4 had worn detonation failure due to normal aging which could be detected in advance by "fruit picking equipment" (Aviation Week Nov-24, 1952, p. 51) and removed before they caused equipment failure.

- One cloth showed defects which were probably the result of handling during the installation or subsequent use.

* One-dish, more catastrophic type fall-



TREMENDOUS GROWTH in number of avionics systems in modern aircraft emphasizes why the problem of tube failure is a challenge to industry and the military.

ums which would cause sudden and unpredictable movement failures.

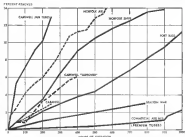
► **Tube Removal Rates**—Azzac found a wide variation in tube removal rates among the eight military facilities participating in the program. The variation reflects the different environments in which the tubes and equipment operate and the maintenance conditions at each base.

The eight participating groups in

cluded that Air Force bases (Carswell, MacDell, and Eggenstein), and Naval

Air Station (Cahoon Field), Norfolk Naval Base (including both aircraft and shipboard equipment), Radio Station WAK (Washington), Army Eastern Command, and Fort Bliss.

Highway tube mortality was recorded at Caswell AFB, where an average of seven JAN type (non-premium) tubes per hundred sockets were measured in



TUBE MORTALITY CURVES in Anne report show that tube failures depend on operating environment, quality of maintenance and use of personnel type tubes



Experienced aircraft specialists... latest equipment... modern plant facilities... and a reputation for meeting or improving on production schedules—that's **Twin Coach Aircraft Division**



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图 10-1-14 设备基础图

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Compare your present assignment with the diversified, stimulating projects that increase the creative challenge of Ford's team of qualified engineers. These men are working on engineering advances for the famous C-119 Flying Boxcar and the soon-to-be-produced C-122 Assault Transport. More than that, they are developing tomorrow's jet fighters... special reconnaissance aircraft... jet landers and transport. The men at Ford's know that planned project diversification keeps them in the forefront of the field of aerodynamics.

You'll be investing wisely in a secure future if you take time today to write to Walter Tyden, Chief Engineer, outlining your qualifications. Your correspondence will be kept in strict confidence, of course.



^a Average measured rate for all tube types under surveillance (IAN are preferred) at all sites is between one and three per 100 sockets/100 hours. Limited experience indicates that a specific premium type tube lasts two to four times longer than its IAN counterpart. Actual reports. The actual improvement made by each member.

Artists are less complex organisms which has had a longer period of degeneration; they have relatively well trained and permanent maintenance personnel. As a result, 'artists have been able to limit their errors sufficiently to mechanical, or catastrophic failures and in those cases that have gone out of control to the point where they are sure the end of useful life,' according to F. E. Lewis, also a contributor.



The job of getting military replacement items down to the arctic figure is primarily not for arctic equipment (e.g. igloos and the military services, with some help from tube and aircraft maintenance).

At three of the participating buses, some two, "transitance is performed by systematically trained but inexperienced enlisted personnel and tubes are frequently stalled in clusters because operators have not often in the time



The landing gear markings shown above are but only of eleven different instrument applications. Tels the story "at a glance" on flap position, oil pressure or temperature, fuel supply and other operating conditions. Konsmat's easy-to-install in both small and large planes.



- Impervious to dust, moisture, gas
- Hermetically sealed brass case



For additional information, go to 10

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Riverside, New Jersey



* **TARGETING TIME DELAYS** employs the exclusive Rock Staff Method requiring fine instrument technology, the watchmaker's art, and the most advanced engineering standards to perform at a strictly

* **TRANSITION TIME** (min): up to 10 s in the range from 0 to 100 s, in 10 s steps; 100 s in the range from 100 to 200 s, in 20 s steps; 200 s in the range from 200 to 300 s, in 30 s steps; 300 s in the range from 300 to 400 s, in 40 s steps; 400 s in the range from 400 to 500 s, in 50 s steps; 500 s in the range from 500 to 600 s, in 60 s steps; 600 s in the range from 600 to 700 s, in 70 s steps; 700 s in the range from 700 to 800 s, in 80 s steps; 800 s in the range from 800 to 900 s, in 90 s steps; 900 s in the range from 900 to 1000 s, in 100 s steps; 1000 s in the range from 1000 to 1100 s, in 110 s steps; 1100 s in the range from 1100 to 1200 s, in 120 s steps; 1200 s in the range from 1200 to 1300 s, in 130 s steps; 1300 s in the range from 1300 to 1400 s, in 140 s steps; 1400 s in the range from 1400 to 1500 s, in 150 s steps; 1500 s in the range from 1500 to 1600 s, in 160 s steps; 1600 s in the range from 1600 to 1700 s, in 170 s steps; 1700 s in the range from 1700 to 1800 s, in 180 s steps; 1800 s in the range from 1800 to 1900 s, in 190 s steps; 1900 s in the range from 1900 to 2000 s, in 200 s steps; 2000 s in the range from 2000 to 2100 s, in 210 s steps; 2100 s in the range from 2100 to 2200 s, in 220 s steps; 2200 s in the range from 2200 to 2300 s, in 230 s steps; 2300 s in the range from 2300 to 2400 s, in 240 s steps; 2400 s in the range from 2400 to 2500 s, in 250 s steps; 2500 s in the range from 2500 to 2600 s, in 260 s steps; 2600 s in the range from 2600 to 2700 s, in 270 s steps; 2700 s in the range from 2700 to 2800 s, in 280 s steps; 2800 s in the range from 2800 to 2900 s, in 290 s steps; 2900 s in the range from 2900 to 3000 s, in 300 s steps; 3000 s in the range from 3000 to 3100 s, in 310 s steps; 3100 s in the range from 3100 to 3200 s, in 320 s steps; 3200 s in the range from 3200 to 3300 s, in 330 s steps; 3300 s in the range from 3300 to 3400 s, in 340 s steps; 3400 s in the range from 3400 to 3500 s, in 350 s steps; 3500 s in the range from 3500 to 3600 s, in 360 s steps; 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7200 s in the range from 7200 to 7300 s, in 730 s steps; 7300 s in the range from 7300 to 7400 s, in 740 s steps; 7400 s in the range from 7400 to 7500 s, in 750 s steps; 7500 s in the range from 7500 to 7600 s, in 760 s steps; 7600 s in the range from 7600 to 7700 s, in 770 s steps; 7700 s in the range from 7700 to 7800 s, in 780 s steps; 7800 s in the range from 7800 to 7900 s, in 790 s steps; 7900 s in the range from 7900 to 8000 s, in 800 s steps; 8000 s in the range from 8000 to 8100 s, in 810 s steps; 8100 s in the range from 8100 to 8200 s, in 820 s steps; 8200 s in the range from 8200 to 8300 s, in 830 s steps; 8300 s in the range from 8300 to 8400 s, in 840 s steps; 8400 s in the range from 8400 to 8500 s, in 850 s steps; 8500 s in the range from 8500 to 8600 s, in 860 s steps; 8600 s in the range from 8600 to 8700 s, in 870 s steps; 8700 s in the range from 8700 to 8800 s, in 880 s steps; 8800 s in the range from 8800 to 8900 s, in 890 s steps; 8900 s in the range from 8900 to 9000 s, in 900 s steps; 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knowledge, or failures for distinguishing between good and bad tubes."

► **What Comes Naturally**—"It is difficult to even imagine for maintenance men of average technical background to identify the true source of trouble. The tendency is change tubes rather than to delve into the true cause also has a psychological basis, in that tubes are easy to change and are considered relatively cheap," the Anac report says. It is a plea "for the only available method of quick trouble-shooting."

Anac cites the electronics school at Fort Belvoir where instructors teach students trouble-shooting techniques by installing defective tubes to create equipment malfunctions. This instructs students conditions maintenance men to suspect tubes when they later encounter equipment failures.

► **Damage**—**Parts Handling**—"The process of designing a tube while in place of it is a compact, general-day equipment are relatively large, and increase if any subassembly or other component has to be removed and re-placed," the report continues. "The design may occur passively as the design is being changed or actively as the design is being changed or actively as the design is being changed."

With resistance and substitution tubes, less parts can be damaged easily, or broken in the process of removal or installation.

► **Waste of Time**—M one AF test,

data showed that some tubes were applied 50% of the time when equipment came in for service, yet 30% of these removed tubes later showed as defective. The report concludes that "under these circumstances, trouble-shooting by replacing tubes is a waste of time (only) that will become even more true (as waste time is made) of whole tube types."

Anac found examples, for example at Station WAF where it reports that maintenance personnel had proper training, tools, and time to do a good job. However, the report concludes that "while the maintenance situation can and doubtless will be improved in practice in case of national emergency it cannot be expected to be any better than at present, and it will probably be worse."

► **Challenge to Designers**—"Frequent maintenance involving excessive handling and substitution of tubes may easily defeat the very purpose for which it was instituted by introducing more defective tubes than it detects. If an equipment is to be subjected to a rigorous maintenance, it should be designed to provide performance not facilities so that maintenance men be forced out with a minimum of tube handling," the Anac report emphasizes.

"Real progress toward improved reliability... will be made only if emphasis is placed on the design of equipment for easy servicing rather than in the

improvement of maintenance (personnel)."

The report urges designers to provide:

- **Unfettered construction of subassemblies**, with provision for quick replacement.
- **Maintenance indicators built into each subassembly**, or an automatic system to "eliminate the malfunctioning unit from the system."

Although this may increase system complexity, Anac believes that reliability will nevertheless be improved.

► **Marginal Performance**—"Results of the maintenance program show that equipment is now designed largely in accordance with performance of its operation and that no margin of performance is left in reserve for unfavorable conditions or any kind of emergency," the report says. This... puts an additional heavy burden on inadequately trained maintenance and operating personnel."

For example, it is not enough to design equipment to perform satisfactorily when tube transconductance is within the range called out by JAN or MIL specs for new tubes. A properly designed equipment, the report says, should perform satisfactorily until tube-transconductance has fallen to the last specified for maximum JAN life test.

To illustrate this point, the report says that 45% of a batch of 6AK5 tubes replaced for low transconductance as evidenced by poor equipment performance, were actually higher than the value specified by maximum JAN life test and would have been acceptable if the equipment were "properly designed" by Anac standards.

► **Another Example**—"When double triodes with very high gain are employed as pre-amplifiers in servo amplifiers, tubes with very low microphonic output are usually required, the report notes. Many times, equipment manufacturers prescribe tubes to get out with low microphonic output. When it becomes necessary to replace these tubes in the field, the maintenance men either do not know of the low microphonic output requirements, or the tubes will come back for poor selection."

The result is unsatisfactory equipment performance and as the tube is replaced again and again until, by means chosen, one with low microphonic output is found, the report says.

Another version of the same problem occurs when a manufacturer affects a tube like the 6AL5 (precision version of the 6AL7) for its low microphonics but fails to note on the charts or in the literature that the 6AL7 is electrical JAN equivalent except for low microphonics, cannot be substituted if a space 6AL5 is not in stock.

► **Good Bill of Health**—"Out of 11,000 different receiving tube applications

stalled, Anac found only 40 areas instances of misapplication. These were all shown up quickly because of large quantity tube returns.

Many faults listed at misapplication which produce only slight tube handling and cause only minor reduction in equipment reliability are much more difficult to detect. Examples of this type include tube size.

► **At maximum rating** when another type is available which could be operated at a more conservative rating.

► **When not designed for particular applications** and where a more suitable type is available, such as using a pentode in a triode connection.

Anac warns that the total effect of many subtle types of misapplication may be more serious than a single severe misapplication of one tube type.

► **High Temperature**—Tubes capable of tubes designed very rapidly when tube temperatures are allowed to reach 200°C in still glass tubes associated with normal processing, Anac reports. Keeping tube temperatures within safe limits is the responsibility of the tube manufacturer, equipment designer, and the aircraft manufacturer who installs the equipment in the aircraft, and thus determines its ambient temperature.

In one radio bombing system, failure

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Automatic Data Reducer

Automatic data reducer, developed by Lockheed Aircraft Corp. interprets, summarizes and results information received in aircraft flight test data on magnetic tape, converts it into binary code which is recorded on punched cards for later use by automatic computers or graph plots. The electronic recorder can save from 7000 to 10,000

One hour contains flight information, test results, vibration, and the other two hold the bulk of the test data. The two latter tapes may contain more than 40 elements each. Locked up. The computer data that the equipment can data reduction time from a record of travel with as little as two-hour days.

rates of 6AR6 used in the power supply went from five times higher than the average of all other tube types. Investigation showed that the temperature of these tubes reached 345°C during flights above 30,000 ft, roughly 100°C above maximum rating, with the power supply installed as an important section of the airplane.

► **Powerful Beliefs**—Two corrective measures were taken: transfer of the power supply to a pressurized zone, and installation of more effective blowers in the equipment. A temperature check after selection showed average bulb temperature had dropped to 131°C for all 6AR6s and their position cooler.

parts, type 6AR6. The changes were made at different times in various aircraft but are now being completed during the second quarter of 1952.

Tube type-criteria of the 6AR6 and 6AR6 dropped sharply from an average of 37.1 to only 4.8 for a four-week period (see graph, p. 50). Avian also indicates the improvement in reduced tube temperature; moreover, there was no significant change in replacement rate of other tube types used in the same heating cycle.

► **Operating Procedures**—Operating procedures have an important bearing on tube reliability, a fact which the engineers who write instruction books and

operating placards would do well to note. For instance, a hot tube (usually practice to sustain flight down to put the control, autopilot, radio, and similar gear in "standby" condition so that tube failure will be recognized and the equipment ready for instant action when needed.

Long periods of standing operation, with heaters engaged but with audio power off, may induce interface films from the tube cathodes, a major cause of tube performance deterioration. Avian data shows:

Improper operation of a radio transmitter usually produces more tube damage than improper use of a receiver, which is the explanation for the higher mortality of transmitting tube types. For example, an improperly tuned radio transmitter can result in high plate dissipation, which in turn can produce a variety of tube failures.

► **Not So Good Out**—Avian's report does not single out equipment failure factors for constructive criticism, much of the report is devoted to Avian's findings on tube characteristics—these comparative mortality rates and tube value weaknesses. A report on these findings will be the subject of a later Aviation Week article.

Many aircraft equipment designers are probably still a portion of the blame for past use in the military. All too frequently in the past the military service have insisted on squeezing all possible size, weight, and performance out of a new type of equipment, at the expense of reliability, while giving lip service to the need for easy maintainability. This was not a capricious military whim, but a requirement imposed by the need for more and more efficient equipment without compromising aircraft payload or range.

► **Recommended Reading**—Without attempting to place blame, the Avian report documents the consequences of past use and avoidance.

All segments of the industry, including military engineers who supervise industry's development, could well study this last general report and use existing reports in detail. Copies are available for 50 cents from L. R. Davis, Aeronautical Radio, Inc., 1513 "U" St. N.W., Washington 5, D.C.

Transistors Simplify Fuel-Gage System

The nation's first completely transistorized remote fuel measuring system (capacitance type) has been unveiled by Minneapolis-Honeywell. The new device is 75% lighter, 50% smaller, and uses less than half the power of comparable systems employing electron tubes, M-H says.

The new fuel gage, first shown at the

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VIBES IS FIRST transistorized design—see lines in action, page M18.

recent national R&E convention, was MIF's recently announced power-type transistor which develops sufficient power to drive the panel indicator. Voltage-per-volt accuracy is maintained through the temperature range of —60°F to 165°F, company says.

Use of transistor enabled MIF to combine system amplifier and panel indicator into a single linearly loaded unit, eliminating previous large separate electronic-tube amplifiers. New two unit transistorized system weighs 2.5 lb., compared to 5.5 lb., for previous three unit tube version.

Big Airports to Get New Bendix Radars

Improved Bendix Radar air search lineer and precision approach radar are slated for installation at 35 major airports, including several equipped with color ASR and PARs.

Important new feature of the ASR-3 traffic control radar is an automatic direction finder which identifies an aircraft during its radar transmissions by returning a line through the airplane's key on the radar scope.

Where They Go—The new ASR-3, now being tested by the Civil Aeronautics Administration at Baltimore's Friendship Airport, will replace older equipment at LaGuardia, N. Y. International, Chicago, Washington, Atlanta, Los Angeles, Boston, and Cleveland. Airports presently without radar at Knoxville, Louisville, Nashville, Ft. Worth, Kansas, Honolulu, Denver, and Buffalo, will also get ASR-3.

The new PAR-2, under test at Philadelphia International Airport, will be installed at Pittsburgh, Detroit, Oakland, San Francisco, Portland (Ore.), Seattle, Kansas City, Indianapolis, St. Louis, Dallas, Houston, and Anchorage (Alaska), as well as replacing an older

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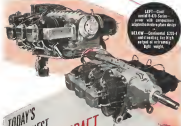
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set at Newark Airport in New Jersey.
► Other Features—In addition to ADF provision, the Bendix ASR-1 provides moving target indication (MTI) which enables radar operator to blot out false returns from fixed ground objects, leaving only airborne targets. The General Electric ASR-1 also has MTI. The ASR-3 also provides video mapping which reproduces a map of the surrounding area on the radar scope to indicate obstructions or other danger areas.

Weather predictions, which greatly reduces man-clutter on the scope during a storm, can be provided but is not called out by the CAA spec, a Bendix spokesman says. The company reports it currently has orders for GC-46 from several foreign governments for installation at Copenhagen, Gander, Bombay, Frankfurt and Hamburg.

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► Experts Visit Air Arm—Dr. Elton Woodbridge and Dr. Simon Russo have been recent visitors to the Westinghouse Air Arm plant in Baltimore. This privately operated plant is now under contract to Air Arm, which was the largest competitor in the interceptor for control field when Russo and Woodbridge were discussing the technical aspects of Hughes Aircraft Co. "Troubles with Air Arm's recent contract recently led Navy to cut back on production, at least for the time being."

► Company Get Flight Director—Air Transit has purchased Collins Radio Company's Integrated Flight System for use on carriers at the Naval Air Station in San Diego, Collins reports.

► New Digital Computer Rule—Jacobs Instrument Co. has proposed to USAF a digital computer for use with flight simulators, claiming advantages of versatility, accuracy, cost, etc., and ease of manufacture and repair. Company proposes to use its Janicomp-C at 40, described in *Aeronautics Week*, Feb. 1, p. 45.

► New Gun Consultant—Henry Koser, former chief engineer of mechanical instruments at Republic-Pittman Division of Bendix Aviation, has formed the Koser Co. to do consulting engineering in gyroscopes, navigation systems, and non-visual. Company address is 101 N. Franklin Turnpike, Mahan, N. J.

► F-400 Aircraft Weight Reduction—Lear has proposed to USAF a modified version of its F-400 subcompact now used in the F-400, which would save 35 lb. of weight, eliminate crash duplicate weight gear now carried. New "Super F-400" would eliminate need for separate nose gear, fuselage reduction, vertical gear, landing indicator directional gear.

MORE LEAR AUTOPILOTS WERE PRODUCED IN 1953 THAN ALL OTHER MAKES COMBINED!



TCA Reports on Freighter Operations

Airline reworked various Bristol features to fit craft for rugged northern operations; personnel like the ship.

By George L. Christian

Montreal—First tangible evidence of Trans Canada Air Lines' two-year fleet expansion program was the arrival in July of three English-built Bristol Freighters (Aviation Week Sept. 7, 1953, p. 49). The planes were put into service just before Christmas of last year to help with the holiday rush of mail and passengers.

Other aircraft will soon join TCA's current fleet of 33 North Stars, 35 DC-3s and 31 Freighters. They are eight Turbo-Compound-powered Super Constables and 15 turbo-prop-driven Vulcan Viscounts. The latter will give TCA the heaviest transport fleet in North America.

Engineering & Maintenance

Although the Bristol 770 Freighter is still relatively new to TCA, engineering and maintenance personnel, they told Aviation Week that these preliminary impressions of the aircraft and its Bristol Blenheim engines is that they will give a minimum of trouble.

• **Sleek and rugged**—E. Petrucci, TCA's regional manager of maintenance at Malton Airport, Toronto, was pleased with these features of the aircraft:

• **No hydraulic system.** Bristol eliminated the hydraulic system on the Freighter Landing gear is fixed, flaps and brakes are pneumatically operated and windshield wipers are electric.

• **No vacuum system.** TCA had the Freighter modified to eliminate all vacuum flight instruments. Therefore, nose draining is accomplished by pump ring draining fluid through porous metal strips in surface leading edges, no vacuum pumps are needed.

• **No fuel dumping system.** The Freighter's maximum takeoff and landing weights are the same—44,000 lb. This eliminates the requirement for fuel dumping equipment to bring the plane's landing weight down quickly in case it becomes necessary to land immediately after taking off at maximum gross weight.

• **Fixed gear.** Main and tail wheel leading gear are fixed. While unditchable during the plane is light, the fixed gear characteristics need for heavy starting equipment and accurate maintenance, and the hydraulic system for other power sources to operate the gear. The fixed gear is extremely rugged—it withstands the heaviest exposure to landing on rough fields or snow-covered fields and over.

• **Easy to handle.** Freighter pilots report that the plane handles well and makes wonderful landings.

One pilot expressed his opinion this way: "The machine flies like an Aeronautics in the clouds and pool on the clouds." The plane has excellent climb characteristics and generally performs much better than expected.

During a flight on the Freighter from Montreal to Toronto, another TCA captain told this reporter: "The aircraft handles more like a smaller than like a transport. . . . The plane's nose tabs

make the controls very light to handle, making you sit back to control the ship. . . . It is easy to hold even full rudder in case of angle-of-attack operation."

• **Off the Shelf.**—TCA bought its three Freighters "off the shelf." As a result, it had to ask that certain modifications be made by Bristol, or accomplish them as its own overhaul shops after the aircraft had been delivered.

Here are some of the more important modifications performed by TCA on its Type 770s, according to F. T. Mason, TCA's special assignments engineer:

• **Revised electrical system.** The re-thermal layout in the cockpit had to be changed. All the instruments were moved. Some were manually relocated to conform to TCA's streamlined instrument layout. Others were removed and replaced with other instruments which do the same job.

For instance, of vacuum-driven flight instruments were replaced with electrically driven units. Alternating current for the instruments is supplied by two inverters operating off the main bus. The output of either is sufficient to meet all air needs. TCA personnel call for using the over-voltage inverter on all over-ambered lights and the additional overhead inverter on additional overhead lights, to replace wear on the wicks. A third, standby inverter is available for emergency.

The relocation and replacement of these instruments involved some wiring changes. While in the process, TCA engineers found that some of the Freighter's wiring did not come up to



PLANT OF RUDDER INSIDE. Freighter's hold can take a 10-ton light (left) or 12-ft. steel girders for main beams (right).



the standards TCA had set for its passenger aircraft.

TCA engineers readily admit that that was their first experience with an aircraft designed primarily for the carriage of freight. Nevertheless, the carrier decided to receive the Type 770s in accordance with Trans Canada's standard practice.

An example of wiring practice that was set up to TCA's standards: Rewiring was handled through relatively disorganized lightning bolts without cladding protection between wires and bare metal.

The Freighter's many light switches posed a problem. British practice is the reverse of U.S. and Canadian custom. British use the "off" position for "off" and the "down" position for "on." At first, TCA thought it could simply reverse the logic switch panels, but that made the identification impossible and so the switches had to be changed down-to-up panels were made.

• **Auto selective pitch.** Conventional equipment on the Freighter was automatic propeller pitch controlling—comparable to auto prop functioning in the U.S., except that blades go to only within a few degrees of the full-down position.

But TCA did not want auto pitch controlling, because it did not need the added performance this feature permits. So TCA added Bristol for what they termed "auto selective pitch control."

Here is how it works. Before use the same pilot differential pressure among wings. There are two pitot tubes on each wing, one outside the propeller wash, near the wingtip, the other just outward of the engine nacelle, inside the prop wash. If an engine loses power, differential pressure by its prop washes. When the loss amounts to 75% of the maximum with control at

full-down position, the differential pressure between the two pitot tubes on that wing causes the auto selective pitch controlling system to select the prop of the advancing engine. It arms the system and lights a bulb on the instrument panel above that engine's tachometer telling the pilot which engine is apparently losing power.

The pilot checks the instruments of the engine in question (tachometer, manifold pressure, fuel pressure, etc.) and also judges by the feel as he reduces pitch, to see if the engine is really losing power or if the malfunction has cleared.

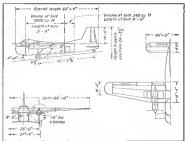
If there is a bona fide power loss, he pushes a single prop blade controlling button on the left of the control wheel and the prop blades of the malfunction-

ing engine immediately convert. Pilot does not have to choose a special button for the prop—the system automatically selects the correct propeller.

Advantage of this system is that the pilot has control of the controlling action and restores it only when he is satisfied that power failure is sufficient to warrant going on single engine.

The system is operative only when throttle is set full forward power position.

• **More than TCA.** Engineers at Avco Canada believe installation because of the extremely cold weather the Freighters would fly in. The two 16,000-hp. Bristol engines, supplied with the plane, were removed from the post frost loading dock and replaced with a 120,000-hp. Bristol engine reman-



Bristol 770 Freighter

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SACRAMENTO, CALIF. 95811



STANDARDIZE CAR ride up wing

tared by the Aircraft Maintenance div. of Surface Construction Corp. This installation not only provides more heat, but standardizes the heater with those to be installed in the 12 Vietnam Vectors TCA will receive later. Only difference is in the fuel discharge route. In the Vectors it will be designed to discharge IP-4 jet fuel and in the boats 180 140 octane gasoline.

The installation also includes three features: heater operates continuously instead of cycling on and off as in most U.S. vessels; a controllable temperature sensing element positions a mixing valve which blends fuel to correct proportions of outside cold air and heater air to provide discharge air of the desired temperature; excess hot air is dumped overboard through a special duct.

TCA also built a special right-angle, removable air duct to connect the down-ported heater to the wing hold heater ducts when the nose doors are open to land in cold water. This, heat may be distributed during the whole landing or unloading operation to protect perishable cargo and keep cargo handlers warm.

• **Firefighting system.** Trans-Canada gets fitted to match firefighting protection plans to deal the ship's body lines and masts which the pumps might ding into its sides during powered operation.

• **Firefighting features.** Here are some Firefighting features which are not available found on American built civil vessels.

• **Autobreak system.** Firefighting is equipped with the TKS autobreak units. The system pumps Auto Shell Compound #7 searing fluid directly attached with glycerine added for charring quitted through porous metal strips mounted in the leading edges of the surfaces. System includes 50-gal. auto wing fluid supply tank, two electric motor-driven pumps mounted in gal-

Boat-mounted heaters are on each door

ried, and near distributive lines which supply also porous dispensing strips.

Three strips are located in the leading edge of each wing, one each in the horizontal stabilizers, and one in the vertical fin.

The 34 gallons of driving fluid is sufficient for three hours of continuous operation. TCA practices calls for top going off the supply ducts at every stop during winter flow.

Under normal conditions, only one pump operates at a time, the other acting as a standby unit.

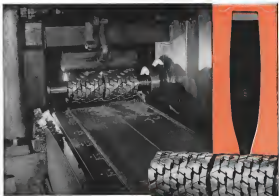
Pilots say that the system works effectively as a device as well as an anti-ice. They report cases where the system quickly removed ice which had already formed on the wing.

They say also that if the TKS system is turned on for a short while during final approach, fluid will run back over top surfaces of the wing and stabilizers. This makes it easy to remove any snow or ice which might accumulate while plane is on the ground.

• **Ice detection.** The Firefighting is equipped with an ice-detecting system. A small metal mesh protrudes from the forward fuselage near the pilot's side of the cockpit. Small heated tubes in the mesh dig up ice when the slightest amount of ice begins to collect. This causes differential pressure changes to cause a microphone, lighting a red light in front of the pilot. He may turn on the TKS wing autobreak system, the pump and system (which uses the vent fluid in the wing) or the windshield system (which uses alcohol).

As soon as the red light goes on, a heat heater is turned on through a delayed action switch. In a few seconds, the ice on the wind is melted off and the whole system is ready to go to work again.

• **Passive system.** TCA registers its part the Firefighting's passive system has been trouble-free so far. Two fly-



OK alternate angle cutters

slab-mill tough chrome-nickel-moly prop blades at Curtiss-Wright

FEED 8.26 inches per minute

SPEED 20 revolutions per minute

DEPTH OF CUT from .0055

to .010 inches

LENGTH OF CUT 123 inches

STEEL, Chrome-Nickel-Molybdenum alloy

CUTTERS 16 mounted 8 and 8 for straddle milling

Clash-milling the taper on 25x123x.500" chrome-nickel-molybdenum steel plates for the famous hollow-steel propeller blades used on big B-36 (International) bombers is regarded as one of the more rugged manufacturing assignments at the Curtiss-Wright Coldwell plant.

For this second operation, 16 OK alternate angle cutters straddle the center ribs of the blades, 8 and 8, are mounted on a 75 hp planetary miller. The upper straddle 123" increasing from 9.635 to 9.10". The cutters are standard OK alternate angle mills with overlapping high speed steel blades. The angular set gives a shearing action, cooling and tamping the chips away from the cut. Streamline in design, OK cutters are free from pins, screws, gibs and locks. They pack butler blades for heavy cuts and more blades per body for finishing cuts. Blades are secured by a driving fit. Metal serrations in body and blades prevent any lateral movement and provide a life wide adjustment to compensate for wear.

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ing engines "If they'll last, they'll start."

• **Aviatic Systems**—These are the TCA's major systems.

• **Fire protection**—When a fire warning occurs, a light shows up in the cockpit bottom of the engine concerned. Activation of the button not only flashes the lamp but also dumps the contents of a 1-lb bottle of methyl bromide down the carburetor air intake. Pilot may manually discharge another 6-lb bottle into the accessory section and a 1-lb bottle through a center spray ring mounted between the engine and fuel of cylinders.

• **Ignition switches**—Two master switches, set to operate at 60, are mounted in the body of the aircraft. Both are electrically connected in series so that failure of one does not tap the system. The switches automatically discharge all the methyl bromide bottles mentioned above. In addition they disconnect the entire electrical system from the main bus.

Essential to the emergency bus, which supplies power to engine the essential systems for engine starting system, one radio transmitter and one receiver, cockpit and emergency lights, and the operation of the instruments on the left side of the instrument panel. The emergency bus, whose current is supplied by the primary batteries, is completely independent of the TCA's normal electrical system.

• **Heat distribution**—Hot air from the heater is fed into a duct mounted on top left side of the cargo hold. A special duct transfer hot air to the cockpit. Airflow is controlled by the pilot through a damper.

In the hold, eight fans with individually controlled dampers bring the air from the main duct to floor level. Two other fans will bring air to the passenger lobby behind the main cargo compartment and the heater in the tail of the aircraft.

TCA officials say that carrier walls are being made to shed off particles comparatively so that their fleet may be minimally controlled.

These temperature-measuring units, located in the forward and center sections of the hold and in the lobby, tell the pilot on a single instrument the heating conditions in these three sections of the plane.

TCA & Freight

The Bristol 170 was conceived from the beginning as a freight aircraft and every possible consideration was given to making it as functional and efficient as possible. As a result, the plane has outstanding advantages in TCA's opinion—compared to any truck or the North Star—both primarily as a

Bendix jet ignition systems...

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maximum efficiency!

Although jet ignition is a comparatively new development in the fifty year span of powered flight, progress in the vital phase of aviation has been truly remarkable.

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TLN-10 SYSTEM
WEIGHT 7 LBS.

- Lower Cost—Simplified Bendix—Weight Reduction—Expense has declined.
- Higher voltage available at higher plug—improved during over entire range of operation—Visual detection of plug firing difficulties.
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- Simple plug—Easier installation—Easily used and without excessively high temperature—EMI-10 system is engine mounted whereas EMI-1 was both plug and engine mounted.



EMI-10
DESIGN
WEIGHT 37 LBS.



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Barber-Colman aircraft controls perform many important functions on the Goodyear "N"-type airships. Applications include actuators in position inside doors, damp valves, electronic accessories—controls for color temperature and propeller speeds. Here is example again of how Barber-Colman Company's expert engineering service and specialized production distributes most today's exacting requirements of aircraft manufacturers. If you have design problems calling for special applications of actuators and other controls, let Barber-Colman Company help you solve them with custom engineered units to fit your specific needs.



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pressure plate and then converted to a cargo crate.

► **Big and bulky**—Ability of the hold to take large, bulky, awkwardly shaped loads is a big asset. Loading door is 50 in. wide and 96 in. high. Cargo hold capacity is 1,500 cu. ft. and hold length is approximately 32 ft., with an additional 5 ft. available at the rear bulge. These dimensions, coupled with a low (4 ft. 6 in.) loading sill, enable plane to handle a large variety of cargo.

Fleet can take about a standard-size automobile at 15 mph, starting from scratch. This time involves setting up the unit, moving two men, and driving the car aboard. Additional cars may be driven in as a matter of minutes.

Once TCA was asked to fly eight long steel girders to the North Country for a roller coaster installation. The girders measured some 53 ft. in length and weighed a total of about 6,400 lb., not counting a large quantity of accompanying nuts and bolts. Upon arrival, it was found that the existing equipment had frozen into solid masses, so the girders were off-loaded by hand, with the temperature down at -32°F. The girders had to be hand-lifted, a little at a time, because personnel on the structure prohibited dragging them out of the hold. This would have been virtually impossible with a high-rigid plane, according to TCA spokesmen.

► **Fast and Easy**—TCA cargo specialists rate these statistics to show the great speed advantage in loading the Freighters, as compared to a North Star cargo plane.

Average loading or unloading time for the North Star is 1,500 lb./hr. On the Freighters, 538 pieces of cargo weighing 5,300 lb. (three persons weighed a total of 2,300 lb.) were off-loaded from a leased plane in sub-zero weather in 18 min. In another instance, a plane with a 12,000-lb. load was turned around in New York in exactly 1 hr.

Two doors carried with the plane to expedite cargo handling are a two-wheeled magnesium load cart which enables one man to handle up to 500 lb. at once; and two skid rollers, 3 in. in diameter and 42 in. long, with which to roll bulky cargo into plane.

A freighter problem cited by TCA is that, if plane is parked on uneven ground with one door higher than the other, handling difficulties makes opening and closing doors difficult.

► **Loading Run**—TCA's supervisor of cargo service, Joe Ray, says, "Anxious. Where details of a new loading ramp, a prototype of which is currently being built by TCA.

The problem will be of all-kind construction and will assume T-4 H

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QC34-2 STANDARD
SYSTEM



QC35-1 PANELED
ELECTRICAL CONTROL SYSTEM

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CLEVELAND 1, OHIO

Wingspan, 500 10 (distance is over 900 miles and company is corresponding and express costs of \$2,500). Montreal-Pe. Williams, \$8.99 (a distance of roughly 750 miles, and express fee is \$7.50).

So, when the considerable increase in spend of transportation disbursements is compared to the relatively light increase in shipping charges, TCA is confident that its service, bolstered by the flexibility of the Bristol Freighter fleet, will see wide expansion in the coming year.

Lightweight Battery Starts Turboprops

(McGraw-Hill World News)

Stockholm—A new Swedish aircraft battery has been developed which reportedly will start turboprop aircraft engines without aid of an outside electrical source.

The battery is said to weigh half as much as conventional lead batteries, is spill-proof and practically unaffected by cold. Endorsed by the Swedish Battery Corp and based on a British invention, the battery reportedly has been tested successfully as cold-weather operation on the Vikinga Visconti. Vikinga and Rally-Royce participated in the tests, according to the manufacturer.



Safe Work Ladder

All metal step-ladder developed by Lockhead Aircraft Service's New York base is safe and convenient, LVS reports. Based on a one-year trial using 24 ladders, LVS estimates it will save \$5,658 over a five-year period by using these step-ladders instead of buying, repairing and replacing work at LVS's Idlewild base in the one-year test will add up to more than 75% of the total ladder cost of the new ladders. During the year not a single accident due to ladder failure was reported.

ELECTRICALLY HEATED PIVOT (AIRSPED) TUBES

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Manufacturers of electrically heated aircraft parts since 1925



NEW AVIATION PRODUCTS



ILLUMINATED TAXIWAY sign is clearly visible in transport as it leads for runway

Taxi Guidelights Aid Pilots, Tower

lluminated runway guidance signs recently installed at Greater Pittsburgh Airport help pilots find their way across the 6,100-acre field. This is said to be the first such complete installation on a commercial airfield, at least in this country. Pilot recognition of the lights is reported to be excellent.

Principal advantage of the 55 signs installed at Pittsburgh is that they allow pilots who are unfamiliar with the location of runways, taxiways, ramps, parking areas, etc., to find their way around simply by following the signs instead of having to receive complex instructions from the control tower. This reduces conversation between pilots and tower crew both ways time to concentrate on other matters.

► **Follow the Signs**—With the signs, the control tower operator simply tells the pilot what runway he is cleared to, wind direction, time, altitude setting, delivered with such advice as "... the runway ahead is your right and follow the signs". Only other requirement is for pilot to get clearance to cross active runways and to take off.

The signs have completely eliminated a situation which used to arise occasionally: pilots getting lost, particularly in bad weather.

Another advantage is that pilots can see signs from a distance of 500 ft. Runways can taxi at steady ground speeds of about 55 mph without loss of visibility; a runway or taxiway to slow down to make sure they are on the right path. This makes ground operations easier on pilot and plane and expedites ground traffic. During Pittsburgh Airport's rush hours the tower 5-6 pm is particularly busy and take off at a rate of one a minute.

Manufactured by the Crown-Hinds Co., of Syracuse, N. Y., the signs are made of aluminum and contain from one to an unbreakable glass lens which can be inserted from either end. The lenses, whether air symbols are made

of unbreakable translucent plastic or a black background. Runways are provided by a 125-lumen, 6.6-amp. lamp in a standard 25-watt, 120-v. bulb.

► **Breakable Cowlings**—The signs are mounted at 45° to runway and taxiway runways and other signs point. They serve for both in- and out-bound traffic, since both sides give information. Markers are oriented on breakable cowlings at heights varying from 20 to 30 in. above the ground.

When designing runways, the runway markers are so arranged that ideally both ends of the runway face the pilot. For instance, if he sees "32-14," he knows that, because the 32 faces up to the left of the sign, the 14 end of the runway is to his left, the 14 end to his right.

Some of the abbreviations used with the signs are: "VORT" for standard airport; "MIL" for areas set aside for military planes; "CUBC" for areas for cargo aircraft and "BGR" for baggage air cargo area.

The signs can be installed on existing Crown-Hinds type RLR, two light bays if they are properly located, according to the manufacturer.

Unusual Suspension Mount Controls Vibration Shock

A new mechanical suspension system of tested design absorbs vibration and shock that could damage delicate aviation equipment. It can be used for the placement of missiles, jet engines and other large units, as well as for the mounting of various equipment in aircraft.

The new mount has five springs, acting in different planes of tension and pressing resiliently on an inner ring. Application of load causes an unusual deflection in each spring, giving each a different period of vibration. This restriction prevents the resonant buildup

of amplitude which occurs in other spring mount systems, thus helping to protect the load, says its designer, Ray Applegate of Mechanical Suspension Mount Co., Ltd.

The period of vibration in any particular spring in the mount is designed with deflection. This is done, Applegate points out, to the use of conical water compression springs and inner tension springs with nonuniform and varying coil diameters. The inner springs prevent the outer and serve as a damper.

Applegate says that his mount has passed numerous performance, environment and endurance tests. It has shown excellent ability to absorb airport loadings.

A Fiberglas container incorporating the mount and built to comply with Specification MIL-64 requirements for light weight, shock, and landing, penetration and air, mounted at the moment, has been undergoing vibration and drop tests for about a year. It withstood room temperature tests with no delamination, as evidence of the container is shown. At very low temperatures, container coatings failed and wiring systems became brittle, but the springs in the mount were unaffected and the unit is still good as new, Applegate claims. Production containers will weigh less than 10 lb., the designer says.

Since the mount is a complete assembly in itself, it may be used as a handling dolly on a shipping or storage unit, with or without a container. Mechanical Suspension Mount Co., Ltd., 110 State St., Westbury, L. I., N. Y.

Rugged Pressure Gage Omnis Linkages, Springs

Extreme ruggedness and high accuracy are claimed for a new type of pressure gage, now reported as standard work a number of aircraft and missile manufacturers.

In these gages, the indicator is attached directly to the closed end of the tubular pressure coil, instead of being tied to the Bourdon tube through linkages, multiplying gear, hair springs, etc., as in usual pressure gage design.

The manufacturer says his units have no mechanical tolerances which limit up to 500, and 1000 psi. Indicators range from 10 to 100 psi and 0 to 60,000 psi. The gages will withstand a 100% graduation gauge without loss of accuracy. They are constructed of steel, and resistant to oil, water, and fungus.

The new gages come in a variety of dial sizes, range and capacity ranges, to be used as barometers, with MP or NC threaded connections, and with side or rear outlets. Some units have a

Silhouette-shaped twin jet

joins Douglas family of



Silhouette—Skyrocket speed record 1960, 630 mph



high-speed research aircraft



Skyrocket—world speed records in 43 at 1037 mph, 52,000 feet altitude

—the supersonic Douglas X-3

Now is the record-breaking Skyrocket, the Douglas Skyrocket and the record-breaking carrier-based Skyraider, add this important experimental plane—the Douglas X-3.

Performance is secret, but a little can be told. Larger, heavier than a

DC-3 transport, X-3 has wings smaller than a DC-7's tail—using one critical jet engine for sustained flight. X-3 has already established basic data on ionization, refrigeration, and the use of heat-resistant titanium, while its payload of research instruments has been used to study the stresses and strains of flight at supersonic speeds.

Design of X-3 is another example of Douglas leadership in aviation. Foster and Jeter with a huge payload is a basic Douglas rule.



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Direct Acting
HYDRAULIC PRESS



The Verson-Wheelon Bulletin set shows the simple operation of the Verson-Wheelon Press and shows examples of the work it performs. Typical specifications are also given. It is available on request.

Yes, this Verson-Wheelon Press has a capacity equivalent to a 21,000 ton rubber pad forming press. However, it does a better, more complete forming job than the rubber pad press; yet its cost is only a fraction of that of the conventional press.

The Verson-Wheelon Press illustrated operates at 5,000 psi. Its own feeding tables are each 50" x 146" to handle long channels for a leading aircraft manufacturer.

If you are now doing or contemplating rubber pad forming, you should consider a Verson-Wheelon Press before you buy. Compare the price and compare the work—it's the best way to convince yourself of the economy of Verson-Wheelon forming. The bulletin described at the left gives full information. Write for your copy, today.

A Verson Press for every job from 60 tons up



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cut face is small as 1 in. and weighs less than 1 oz.
Designed for Industry, 4746 W. Washington Blvd., Los Angeles 16



One-Man Unit Handles Sheet and Coil Stock

Colten-Prentiss Co. is introducing a new dual-purpose unit for both sheet and coil stock. One man can handle it. That was developed in cooperation with personnel of the Fisher Body Division of General Motors Corp. It reportedly is capable of handling up to 24,000 lb. of stock.

The latter incorporates a large coil-bearing segment at center of each unloading angle. When loose or bundled sheets are to be handled, coil bearings are swung down into carrying position where they act as carrying angle for double bearing providing extra strength and safety.

Adjustment of pins and carrying angles permits unit to handle wide range of sheet widths and coil stacks.

Colten-Prentiss Co., 1500 S. Klatskan Ave., Chicago.

Milling Cutter Makes 286 Accurate Slots at Once

THE Conant Bessler Co. has made a milling cutter for aluminum extrusions. First cuts simultaneously 286 slots, each 0.125 in. wide and 0.312 in. deep with .075 in. walls between, to finish dimensions. Manufacturer states that tolerances are held in .005 in. on size with no cumulative tolerance.

Unit is produced by the company's Special Products Division, which specializes in products and components for nuclear and jet engines.

THE Conant Bessler Co., Philadelphia 2, Pa.

Automatic Machine Cleans Metal Parts in Batches

Magna Chemical Co.'s Remagent Division is introducing an automatic multi-stage batch cleaning and pretreatment method for metal parts.

Designated "Age Age Automatic," the equipment consists of a series of independent, self-contained dipping units serviced by automatic conveyors.

Dipping, rinsing and transfer of parts from one stage to another is automatic, while parts to be processed are vigorously agitated in each solution according to a predetermined exposure.

Processing cycle can be varied according to technical requirements by action of a timing device. Parts are then removed by one operator.

Manufacturer states equipment can be designed for any number of stages, allows for acids, and also drying operations. It can be installed in any existing production line.

Magna Chemical Co., Inc., Dept. AW, Garwood, N. J.



Lightweight Stop Net Saves Critical Metals

Flurite Stop Net Corp. of America is producing a new lightweight, high-temperature, two-way stretch net that is claimed to be 45% lighter than previous designs, easier to weld and requires up to 75% less critical material. Above photo shows new net (left) one installed with previous Flurite design for the same purpose.

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Rate Ruling Hints of CAB Offset Policy

- First indication is given in Atlantic subsidy case.
- Court decision holds up final PAA, TWA pay.

By Frank Shea, Jr.

First hints of how Civil Aeronautics Board will apply the Supreme Court offset ruling (AIRWAY WEEK Feb. 5, p. 13) were brought to light last week in *Foran v. K. Voness Raddiffe* as the Atlantic division in the trans-Atlantic final rate case, involving Pan American World Airways, Trans World Airlines and the no longer-out-of-American Overseas Airlines.

If Raddiffe's conclusion sticks, CAB will take action to obtain offsets for determining mail pay needs of its carriers, based on their entire operations as required by the court ruling. Gross profits accrued in one division must be offset against requirements for other divisions, the court has held. This is considered particularly significant to air lines with highland domestic/foreign travel operations (AIRWAY WEEK Feb. 15, p. 87).

► **Temporary Solution** — Contingent upon CAB's findings in compliance with the offset decree, Raddiffe advised the following temporary conclusions on trans-Atlantic mail pay:

- TWA's fair and reasonable compensation for transportation of mail over its international routes from Feb. 5, 1945, to Dec. 31, 1955, is \$54,688,065.
- The American's mail pay for Atlantic Division operations from Jan. 1, 1945, to Dec. 31, 1955, is \$71,089,000.

TWA's mail pay for operations over its recent routes, or any routes that will be authorized in the future, will be computed by the following formula: For each calendar month on and after Jan. 1, 1955, an effective rate per dog used mile flown, obtained by dividing designated yield flows during the month into the product of 1.32 cents times the lower of 1,765,671 times the number of days in the month or the designated passenger seat miles flown in scheduled passenger service during the month.

► **Competition of PAA's mail rate** for present or future authorized routes from Jan. 1, 1955, will be accomplished as the case matures as TWA's but designated yield flows during the month will be divided into the product of 1.32 cents times the lower of 1,491,565

New Domestic Airmail Rate Structure

A reexamination of the mail rate structure of the nation's 13 domestic trunk routes is under way.

Civil Aeronautics Board has directed the airlines and the Post Office to submit statements before Apr. 23 regarding:

- New service and rates, which each airline will be file.
- Methods for standardization of equidistance of mileage for mail rate purposes.

CAB wants to devise a uniform rate structure that will permit "uniformity in operation and fee and reasonable to all parties." It has suspended the mail rates effective Apr. 1.

Included in the review are American, Eastern, Trans World, United, Braniff, Delta-CGS, Northwest Coast, Capital, National, Western, Continental, Northeast and Colonial Airlines.

► **Investigation** — F.A.A. Board order last December ordering an investigation into the rate picture has not produced the desired results. Data collected from the airlines has not been sufficient to resolve the problem of standardization or equidistance.

tion of mileage in the Board had anticipated that it was essential to any uniform service mail rate structure, CAB says.

The Post Office Department did not apply the Board with its statement of its ideas on the matter. It is the Post Office's policy to give mail contractors to the airline with the lowest mail rate that has prompted the current investigation. Such a policy would wreck the present mail rate structure, CAB adds.

► **Reactive Rates** — Post Office, concerned with keeping within budget limitations, is interested only in doing business with operators charging the lowest rates. These are the "low four" airlines, whose mail rates are 45 cents a ton mile.

By suspending the rates now, the Board hopes it will be the ground work for rationalization of final rates for the next study, and rates involved in an appropriate uniform rate structure.

When a new rate structure is established in the coming months following the current study, rates will be retroactive to Apr. 1.

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times the number of days in the month or the standard available seat-mile flown in scheduled passenger service.

► **Competition** — In final rates will be calculated at, and not in addition to, the pay previously accorded by them for transportation of mail for the respective periods and operations concerned.

In addition to these findings, the examiner also concluded that ALA's mail pay for its entire system operations from Jan. 1, 1945, to Sept. 30, 1955, is \$25,213,600.

► **Status Difficulties** — Raddiffe pointed out that because the Supreme Court ruling was handed down after evidence had been filed and the records closed, serious difficulties are associated with respect to a final decision in the trans-Atlantic mail case.

Prior to the court ruling, the case had proceeded on the basis that it concerned the setting of final and rates for TWA and PAA for their trans-Atlantic service alone. Primarily as established "final" rates for other divisions of these carriers was treated as final, subject only to the use of possible effect of income earnings.

► **Upon Process** — But the offset doctrine completely upsets these previous, and Raddiffe. "The Board cannot, under the language of the decision, set final rates by divisions—only by carrier. The more basic, the evidence and facts do not evaluate the spectrum of final rates for TWA and PAA in their entirety for the period involved."

The case has been transferred into one of acting "temporary" rates for the trans-Atlantic operations of these carriers, the examiner reported.

He said that before a final rate for each of these airlines can be set, further procedures will be necessary to make the required notes of operations of other divisions to determine the need of each carrier as an individual.

In view of these facts, Raddiffe concluded that this initial trans-Atlantic case decision could not meet the requirements of the offset ruling. As a result, he did not endeavor to do so.

► **Possible Impact** — The examiner did, however, include his own views as to possible impact of the mail ruling upon the two airlines.

He and Post Office holds TWA had



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Hopes for Balboa Decision Fade

CAB defers ruling on case, proposes new independent airline to operate through service to South America.

Civil Aeronautics Board again has deferred decision on proposed New York-Balboa through service and new independent establishment of a single independent airline to serve the route, pending final settlement of the three-year-old case further into the future.

The proceeding, involving three service between U.S. and certain South American ports by means of an engineered interchange, concerns Pan American World Airways, W. R. Grace & Co., Pan American-Cross America, Braniff International Airways, Eastern Air Lines, and National Airlines.

• **Conception.** Route-CAB's latest decision gives the airlines 60 days to submit plans for establishment of an independent operation between Honolulu and Miami, on the one hand, and points served on the combined international routes of Braniff and Panagra.

The Board says consideration of such an agreement would establish two effectively competitive routes:

• **Panagra and Braniff's combined routes,** operating primarily on the west coast of South America.

• **Pan American's routes on the east coast.**

If approved with an agreement involving such an independent airline, the Board says it also would consider possible agreement involving a group of airlines that would provide service to the northwestern U.S. for the new carrier and then through service to and from Balboa, C. Z., and South America.

• **Delay-CAB's** decision also affects certain proposals involving provision of multiple service between northwestern U.S. and Balboa and the west coast of South America as well as service to various points in the Caribbean area.

Voluntary proposals had been submitted for interchange of equipment between PAA, Panagra and Eastern, and the Board also had proposed an interchange arrangement that would include National and Braniff. The proposals with respect to Braniff involve extension of that airline's route from Havana to Miami for interchange purposes.

• **Proposed Braniff-A** previous Board decision against Pan American and EAL was rejected by President Eisenhower last May, with a request that the airline be brought on to duty. CAB complied, reopened the record, and further hearings were held before its decision. Late last week additional oral arguments were held.

Since these oral arguments, oral the

Board, certain events have occurred with substantial impact on the national transportation policy in South America as well as the Balboa route. These include:

- **Initiation of an anti-trust action by the Attorney General** against Pan American, W. R. Grace & Co. and Panagra, seeking to divest PAA and Cross of control of Panagra (Aviation Week Jan. 1, p. 92).
- **Recent interposition with respect to the status of Braniff's routes into Brazil.**
- **Supreme Court** after decision not issuing CAB's authority to support with subsidy funds losses incurred on overseas routes of airlines operating combined domestic-international service (Aviation Week Feb. 5, p. 13).

The Board has re-evaluated the case in the light of these events and has advised a proposal for consideration of Braniff and Panagra routes into a single independent system "in order to achieve a substantial reduction in total subsidy requirements and, at the same time, permit competition U.S. flag carrier service to South America on an economically sound basis."

The Board has re-evaluated the case in the light of these events and has advised a proposal for consideration of Braniff and Panagra routes into a single independent system "in order to achieve a substantial reduction in total subsidy requirements and, at the same time, permit competition U.S. flag carrier service to South America on an economically sound basis."

CAB emphasizes its determination to take action that further would reduce subsidy requirements, saying it is "especially determined to take every practicable step, consistent with the interests of our citizens, to eliminate unnecessary aspects of our air route system and to prevent the establishment of any new situations of that character."

The door also means authorization of new services will be promptly ruled, says the Board, but points out it also uses special scrutiny will be applied to all new route proposals.

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BOAC to Put Comets Back on Four Routes

(McGraw-Hill World News)

London-British Overseas Airways Corp.'s Comet fleet will be back on all routes tested by the jet trans-

ports by May 8, according to top officials four months after the Comet 1 fleet was grounded by a BOAC crash onto Elba Jan. 11.

The airline also plans to inaugurate a new Comet service from London to Nairobi during the first week of June.

• **First Takeoff.**—First of BOAC's fleet of seven Comets (see News 1) and one LAL to resume scheduled service took off May 23 from London for Johannesburg with more than 50 modifications designed to cope with possible causes of the jet liner crashes (Aviation Week May 15, p. 33).

The de Havilland-built transports also will be put back on the route from London to Colombo, Ceylon, Apr. 7, London-Singapore May 1 and London-Tokyo May 9.

The British airline followed the lead of Union Aircrafttime de Transport, French air carrier that put its two Comets back into service Mar. 15. Air France is scheduled to resume Comet operations Apr. 19.

• **Chaos Unleashed.**—Meanwhile, events here are causing three de Havilland Comet crashes resulted from the violation of the BOAC Comet that crashed into the Mediterranean off Elba Jan. 10.

The fourth engine, drilled from the bottom of the sea, also will be examined here.

• **Missing Turbine.**—Turbine section was missing from the third engine recovered from the crash, but American oceanic firm Laidlaw says the shaft probably was broken by collision impact. General belief discounts the theory of disintegration of the turbine around the shaft.

Public inquiry still uncompleted, says the otherwise. De Havilland method reports will testify at the hearing on this finding as to most checks of the Comet 1 and its powerplants.

SHORTLINES

• **Air France** will inaugurate three new services from Denmark and Sweden to Paris this month: Copenhagen-Paris direct, Stockholm-Paris direct and Stockholm-Hamburg-Paris.

• **Northern Orient Airlines** reports have received its passenger loads and revenues on Honolulu-Tokyo route in operation of DC-68 tourist service. Compared to last year's December-January-February quarter, passenger loads are up 191% and revenue is 142% higher.

• **Chickadee (CAB)** Municipal Airport reports takeoffs and landings totaled 100,194 last year, compared with 157,119 during 1952.

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For more details of opportunity, position, salary, and other information, please contact Mr. J. H. Tuttle, Director of Personnel, Sikorsky Aircraft Corporation, Bridgeport 1, Conn.

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Hydrogen Bombs & the Airplane

To quote the wartime Deputy Commander of the world-wide U. S. Air Transport Command, Gen. C. R. Smith, it is not necessary to be a student of military manuals to realize from the current hydrogen bomb tests that something tremendous is going on.

Recent reports American War has received from high military and political circles point up one outstanding fact: The more powerful the weapon, the more vitally necessary it becomes for us to have well-equipped, heavy-lift-carrying aircraft ready to attack the aggressor's homeland.

Much of the current debate over the so-called "new look" military policy agrees on this point.

Gen. Smith, both before his military service and since, has been president of American Airlines. He recently described the current military changes as the revolutionary beginning of a concept of national defense that is more suitable to the American technical genius and to the new set of strategic conditions dictated by mass destruction weapons that can strike "devastatingly, directly at, beyond, and over deployed military forces of the traditional variety." And he has done it better than anyone else in similar aviation whose concerns we have seen.

Even the atom or fusion-type bomb was so powerful that a new word was invented to measure the energy it released—the kiloton, corresponding to 1,000 tons of TNT. Now comes the thermonuclear weapon that required another, newer order of measurement, the megaton—measuring the energy equal to a million tons of TNT. The average explosive power of the Nagasaki and Hiroshima weapons was about 33 kilotons. The 1952 hydrogen explosion has been estimated at four megatons or equal to 4 million tons of high explosive.

"THIS IS EQUIVALENT IN DESTRUCTIVE CAPACITY TO ONE MILLION BOMBERS OF THE WORLD WAR II VARIETY," GEN. SMITH POINTED OUT, "EACH TRANSPORTING FOUR TONS OF TNT."

If you and I were to stand out in the open, watching one million bombers passing overhead, at the rate of 100 each minute, we would be on our feet for 168 hours, or nearly a whole week, before the last of the column faded overhead. That is the meaning of the power of a single thermonuclear weapon—a small one.

Some published reports estimate the power of the Mar 1 blast as "upward of 14 megatons" and that of the biggest of the current series, yet to be exploded, at about 40 megatons, or equal to 40 million World War II bombs!

This revolution in weapons has conferred upon the bomber a potential destructiveness as vast as to make the effective power of traditional weapons (the infantryman, the battleship, all the surface army of weapons) seem almost insignificant by comparison, C. R. Smith explains.

Devastate nations in another war would probably be

fought and settled in a few months or even weeks, he believes.

"The telescoping of the time element seems to me to indicate yet another lesson," he says. "It is that the destructive air battle in a future war would be fought to conclusion long before the traditional surface forces, except those already in position near the enemy's frontier, could be brought into action in sufficient scale to affect the outcome."

This means that the idea of maintaining a huge land army, to be deployed overseas in event of war, seems to have less and less relevance to the new facts of military power as we are coming to understand them. It also would seem to mean that one of the principal missions of the Navy—to transport and support an overseas army—would drop down the list of national priorities.

It probably would mean, too, that the part of the Air Force primarily earmarked for supporting the Army in the field would come to have as large a claim upon national resources.

"These factors," Smith says, "appeal at least to have been given due weight in the new military budget. The recent statements of Adm. Radford reflect the view that basic strategy should be changed, and that force levels should be changed accordingly. President Eisenhower has supported the trend toward a new weapon concept, saying further that the conclusion of these new weapons creates new relationships between arms and materials. These new relationships permit economies in the use of men as we build forces suited to our situation in the world today."

Then C. R. Smith believes we are seeing the beginning of a new national strategy, based on weapons systems in which our margin of technical advantage is greatest. If that trend continues and the new ideas are given their just play, with a cutting away of those elements not needed in support of the new strategy, we should be able to anticipate a rational defense budget within our ability to pay the bill.

It should produce, he says, an actual gain in global military capability and, as due course, a substantial reduction in federal taxes, adding:

"The one thing that seems certain is that the power to strangle instantaneously and crushingly is the surest restraint upon aggression."

"So long as that military power is processed in deepened readiness, benefiting constantly from the highest technical innovation and so dispersed that it could never be overwhelmed or destroyed in a single rush, the peace of the world will be reasonably safe."

"There is no escaping the conclusion being forced upon us. It is that the deterrent force represented by atomic weapons and the capacity to deliver them through the air is also the only sure war-winning force. Science has doomed the old way."

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New Allison "retrofit" kit boosts Allison-powered Northrop F-89 ceiling substantially—costs fraction of new-engine price—can be field-installed by Air Force men.

Rocket firing jets reach new heights

Air Force and Allison engineers have put their heads together to save the taxpayers' money and get higher-altitude performance from veteran Northrop F-89 Scorpions. They developed a field modification kit which gives the earlier Allison J35 models the performance of the latest production model engines and boosts the Scorpion's ceiling substantially—at only a fraction of the cost of a new engine.



These "retrofit" kits can be installed by Air Force Maintenance Crews on a minor

repair basis *right in the field*. Already well started, the modification program will cover several hundred Scorpions assigned to the Air Defense Command at bases in the United States, and to the Alaskan and Northeast Air Commands guarding transpolar routes to America's heartland.

This is another good example of Air Force-Allison cooperation to give America the most airpower per dollar. This teamwork started in World War I and, continuing today, is an important factor in maintaining America's superiority in the air.

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